Lesson # 01

OVERVIEW OF QUALITY MANAGEMENT

PROFESSIONAL MANAGERIAL ERA (1950)

In our present age of market driven capitalism and futuristic knowledge driven economic markets, the decision are made and the trends are set by the professional managers. Unlike their predecessors, the captains of today's business do not own their own companies. They must know the whole business but have control over only one small part. They must be product oriented, process conscious, financially responsible, and public spirited. They must be all things to all people, yet still function as only one cog in the wheel.

If the history of management tells us anything, it is that, no matter what happens; peace or war, prosperity or famine, this world will always be in need of good managers . . . the kind who can get society from "where it is" to "where it wants to be." Can you be one?

What is an Organization?

"**An entity where two or more persons work together to achieve a goal or a common purpose is called Organization."**

There are so many organizations around us. Daily we visit and see many organizations. Hospitals, Colleges, Factories, Farms and Government offices. Mosque/Church is also an example of an organization. People go there and say prayers. Activities of praying are to achieve a certain goal. Similarly, any unit in which two or more persons are working together for some purpose is called an organization.

Unit of Organization:

- **People**
- **Purpose**
- **Process**
- **POLCA**

If there is an organization, then there must be some people. They work as whole for a common purpose, so there must be a defined purpose. If an organization doesn't have any purpose, it will not survive for long run. To achieve the purposes by using people, the processes are needed. Without any process, you cannot achieve any type of purpose or goal. If we see in our daily life, we have some goals. For achieving these goals, we use some processes. So that process is also obvious and important for an organization. The last important thing for any organization is that it requires main pillars of management i.e. **POLCA:**

- **Planning**
- **Organizing**
- **Leading**
- **Controlling**

A manager must perform all theses management functions with **Assurance!**

Quality Focus Approach to Management

"There are really only three types of people: those who make things happen, those who watch things happen, and those who say, 'What happened?"

The total quality concept as an approach to doing business began to gain wide acceptance in the west in the late 1980s and early 1990s. However, individual elements of the concept – such as the use of statistical data, teamwork, continual improvement, customer satisfaction, and employee involvement – have been used by visionary organizations for years. It is the pulling together and coordinated use of these and other previously disparate elements that gave birth to the comprehensive concept known as total quality.

Why Focus on Quality?

To understand total quality, one must first understand quality. Customers of businesses will define quality very clearly using specifications, standards, and other measures. This makes the point that quality can be defined and measured. Although few consumers could define quality if asked, all know it when they see it. This makes the critical point that quality is in the eye of the beholder. With the total quality approach, customers ultimately define quality.

People deal with the issue of quality continually in their daily lives. We concern ourselves with quality when grocery shopping, eating in a restaurant, and making a major purchase such as an automobile, a home, a television, or a personal computer. Perceived quality is a major factor by which people make distinctions in the market place. Whether we articulate them openly or keep them in the back of our minds. We all apply a number of criteria when making a purchase. The extent to which a purchase meets these criteria determines its quality in our eyes.

One way to understand quality as a consumer-driven concept is to consider the example of eating at a restaurant. How will you judge the quality of the restaurant? Most people apply such criteria as the following:

- Service
- Response time
- Food preparation
- Environment/atmosphere
- Price
- Selection

The example gets at one aspect of quality the results aspect. Does the product or service meet or exceed customer expectations? This is a critical aspect of quality, but it is not the only one. Total quality is a much broader concept that encompasses not just the results aspect but also the quality f people and the quality of processes.

How Is Total Quality Different?

What distinguishes the total quality approach from traditional ways of doing business can be found in how it is achieved. The distinctive characteristics of total quality are these: customer focus (internal and external), obsession with quality, use of the scientific approach indecision making and problem solving, long-term commitment, teamwork, employee involvement and empowerment, continual process improvement, bottom-up education and training, freedom through control, and unity of purpose, all deliberately aimed at supporting the organizational strategy. Each of these characteristics is explained later in this chapter.

The Historic Development of Total Quality

The total quality movement had its roots in the time and motion studies conducted by Frederick Taylor in the 1920s. Taylor is now known as “the father of scientific management.”

The most fundamental aspect of scientific management was the separation of planning and execution. Although the division of labor spawned tremendous leaps forward in productivity, it virtually eliminated the old concept of craftsmanship in which one highly skilled individual performed all the tasks required to produce a quality product. In a sense, a craftsman was CEO, production worker, and quality controller all rolled into one person. Taylor's scientific management did away with this by making planning the job of management and production the job f labor. To keep quality from falling through the cracks, it was necessary to create a separate quality department. Such departments had shaky beginnings, and just who was responsible for quality became a clouded issue.

As the volume and complexity of manufacturing grew, quality became an increasingly difficult issue. Volume and complexity together gave birth to quality engineering in the 1920s and reliability engineering in the 1950s. Quality engineering, in turn, resulted in the use of statistical methods in the control of quality, which eventually led to the concepts of control charts and statistical process control, which are now fundamental aspects of the total quality approach.

Lesson # 02

TOTAL QUALITY MANAGEMENT AND TOTAL ORGANIZATION EXCELLENCE

TRADITIONAL MANAGEMENT AND QUALITY MANAGEMENT:

Twentieth-century management has been strongly influenced by Taylor's scientific management and Weber's theory of bureaucracy. These approaches have led managers to work within functional hierarchies, with their responsibilities divided according to specialized activities, such as accounting, marketing, engineering, and manufacturing. Economic principles for competing in well-defined markets emphasized economies of scale, efficiencies, mass production, and technological innovation.

While there had been competition, competitors often played according to a "live and let live" strategy. Because monopolies were precluded by law, companies had little incentive to completely drive competitors from the marketplace.

Even when new product technologies created new markets, such as plastics in the 1950s, management practices changed very little. Managers set goals for productivity, efficiency, and profitability, using management set goals for productivity, efficiency, and profitability, using management by objectives (MBO) to link strategy and operations through the hierarchy. Managers motivated employees to fulfill those goals by inducements such as profit sharing, stock options, and bonuses, or other rewards such as job enrichment or participative management. However, the job of management remained much the same: set goals, define roles, provide technologies, and motivate employees. Accounting, marketing, engineering, and manufacturing practices also did not change. Occasionally, new techniques were introduced within the traditional functions, such as quality control in manufacturing. But such changes went largely unnoticed by the rest of the organization.

No one challenged this approach to management as long as it served society well. While managers in Japan were rewriting the rules of business practice and management and planning to win the world markets by focusing on quality management, U.S. managers continued in the stage of normality. The US, and western society in general, was focused on another agenda: the cold war in the 1950s and 1960s.

The Stage of Replacement: A New Paradigm

The stage of replacement means shifting to a new paradigm. Managers must shift to a new paradigm for managing organizations because of the anomalies that threaten their survival and prosperity. To make this shift, however, they must understand the new paradigm and how it differs from the old paradigm. To initiate this understanding, we will contrast the new (but still emerging) paradigm with the old paradigm.

Themes of the New Paradigm

The differences between the new and the old paradigm are organized around three themes: customer value strategy, cross-functional systems, and continuous improvement.

Theme 1: Customer Value Strategy

Customer value is defined as the combination of benefits derived from using a product (or service) and the sacrifices required of the customer. The customer value strategy is the business plan for offering value to customers, including product characteristics, attributes, mode of delivery, support services, and so on. The theme of customer value strategy may be addressed in many topics, including quality, measurement, positioning, key stakeholder, and product design.

Topics	Old Paradigm	New (emerging) paradigm
Quality	Meeting specifications, inspected into product, make tradeoffs among quality, cost, schedule	One component of customer value, managed into process, seek synergies among quality, cost, schedule.
Measurement	Internal measures of efficiency, productivity, costs, and profitability, not necessarily linked to customers	All measures linked to customer value
Positioning	Competition	Customer segments
Key stakeholder	Stockholder, boss	Customer segments Customer (other stakeholders are beneficiaries)
Product design	Internal, sell what we can build	External, build what customers need

Quality

In the old paradigm, managers define quality in terms of meeting specifications. Quality is assured by weeding out the "bad" products before they are shipped to customers. Managers make tradeoffs among quality, cost, and scheduling under the assumption that relationships among these outcomes are fixed. By contrast, in the new paradigm, managers recognize that product quality is only one component of customer value, and managers seek synergies among quality, cost, and schedule, not just tradeoffs. For example, improving quality by reducing variation in outputs reduces defects, reduces costs, and makes performance to schedule more predictable. Further, quality is more broadly defined than just product quality. Quality applies to every aspect of the organization. It must be managed into processes and systems, and not jut inspected into products. System thinking included to think of all interdependent parts of the system into one whole.

Measurement

In the old paradigm, measurement systems are focused on internal measures of efficiency, productivity, costs, and profitability. This is the tradition of management by objectives. Managers do not necessarily understand how these internally focused measures are related to customer value. In the new paradigm, managers may use internally focused measures, but they are linked to customer value in a broader measurement system. Managers interpret measures in terms of the impact on customer value in the long term and short term.

Positioning

In the old paradigm, managers make strategic positioning decisions based primarily on warfare models on the competition. In the new paradigm, managers make strategic positioning decisions with a focus on market segmentation and customer needs, wants and demands.

Key Stakeholder

In the old paradigm, the key external stakeholder is the stockholder, and the key internal stakeholder is one's boss. All other stakeholders, such as customers, employees, suppliers, and business partners, are pawns to serve the goals of the key stakeholders. In the new paradigm, the key stakeholders are customers, both internal and external customers. Providing value to customers is the key to serving all other stakeholders over the long term.

Product Design

In the old paradigm, the product design process is internally driven, based on the assumption that "we know what is bet for the customer." Managers enact a "push" strategy that aims to "sell what we can build." In the new paradigm, managers develop products after first determining what customers need.

Managers both react to improve products in existing markets and actively seek to create new markets with new products.

Theme 2: Organizational Systems

Organizational systems are the means that provide customer value. These systems broadly include material and human inputs, process technology, operating methods and work practices, streams of work activity, information flows, and decision making. The approaches to managing these systems in the old and new paradigms are discussed below.

Topics	Old Paradigm	New (emerging) paradigm
Cross-functional approach	Negotiation across functional interfaces to obtain cooperation	Cross-functional systems defined, owned, and optimized
Technology	To deal with complexity, to eliminate people problems	To reduce complexity, source of optimization for customer value
Employee involvement	Focused on hygiene factors	Focused on strategic factors
Human resource management	Regarded as a staff responsibility, administration of personnel hiring, firing, handling complaints	Regarded as a critical resource, managed as system input
Role definition	Task and job descriptions set limits	Vision inspires flexibility
Culture	Social and emotional issues are suppressed, politics and power dominate	Connect with individual sense of purpose, emotions, and social meaning
Structure	Specialization, tall hierarchy with functional emphasis	Integration, flat hierarchy with team emphasis

Cross-Functional Approach

The old paradigm does not acknowledge systems that cut across functional or unit boundaries. Managers simply negotiate across functional interfaces to obtain minimal cooperation. In the new paradigm, managers define, own, and optimize cross-functional systems for customer value.

Technology

In the old paradigm, managers use technology to help them deal with the overly complex systems that have grown up in the organization. Also, they use technology to eliminate people problems (robots don't talk back). In the new paradigm, managers prefer to eliminate complexity rather than automate it or computerize it. Managers use technology only to optimize systems for customer value.

Employee Involvement

In the old paradigm, employee involvement programs are implemented without a focus to contribute to systems. Employee involvement in improvement programs tends to focus on quality of work life issues and some limited operational changes. In the new paradigm, employee involvement is strategically focused and contributes to system purposes.

Human Resource Management

In the old paradigm, managers regard human resource management (HRM) as a staff responsibility. HR specialists process paperwork to hire and fire, and handle personnel complaints. In the new paradigm, line managers regard human resources as critical resources and strategically manage them as inputs to systems.

Role Definition

In the old paradigm, managers use task and job descriptions to prescribe and set limits to personal responsibilities. In the new paradigm, managers convey a vision to lead and inspire flexibility. Employees participate in any activities required to provide superior value to customers.

Culture

In the old paradigm, managers suppress social and emotional issues that are regarded as irrational and sources of distraction away from goals and objectives. Power and politics dominate the culture, with individuals jockeying for personal gain. In the new paradigm, managers connect organizational mission and purpose with each individual's sense of purpose, emotions, and social meaning. Individuals channel their needs for pride in workmanship toward strategic purposes.

Structure

In the old paradigm, organizational structure is based on specialization of tasks. The hierarchy is tall, with many levels of managers, and it emphasizes functional lines of authority. In the new paradigm, the hierarchy is flat, with fewer levels of managers, and it emphasizes teamwork to serve super ordinate objectives.

Theme 3: Continuous Improvement

To keep pace with the changes in the external environment, managers have to change the organization. Managers have always made improvements. However, with rates of change increasing in the external environment, managers must improve differently and more frequently than in the past. They must pursue continuous improvement, which is a constant striving to change and make things better.

Topics	Old Paradigm	New (emerging paradigm
Occasion	Focused new product development, episodic, reactive to problems, big breakthroughs only	Focused on broader systems, unending, proactive to opportunities, big breakthroughs and small steps
Approach	Trial and error	Scientific method
Response to error	Punish, fear, cover-up, seek people fix, employees are responsible	Learning, openness, seek process/system fix, management is responsible
Decision-making perspective	Individual political expediency, short term	Strategic, long-term, purposeful for organization
Managerial roles	Administer and maintain status quo, control other	Challenge status quo, prompt strategic improvement
Authority	Top-driven via rules and policies	Customer-driven through vision, enablement, and empowerment
Focus	Business results through quotas and targets	Business results through capable systems, means tied to results
Control	Scoring, reporting evaluating	Statistical study of variation to understand causes
Means	Delegated by managers to staff and subordinates	Owned by managers who lead staff and subordinates

Occasion

In the old paradigm, the occasions for improvement were primarily new product development and reaction to salient problems. Mangers mostly looked for big breakthroughs to get improvement. In the new paradigm, the occasions for improvement are everywhere, every day. Managers improve

proactively at every opportunity, even in the absence of salient problems. Managers improve all aspects of the organization's systems through both big breakthroughs and small steps.

Approach

In the old paradigm, managers accomplish improvements through trial and error. In the new paradigm, managers use the scientific method to study proposed changes and their effects.

Response to Error

In the old paradigm, if they care at all, managers are intolerant of error. They regard error as a personal failure, and they respond with punishment to instill fear in those blamed. The result is fear and cover-up in the future. In the new paradigm, error is not desired; however, managers view error as an opportunity for learning. People openly acknowledge error because managers do not assign personal blame, but seek to fix a process or system.

Decision-Making Perspective

In the old paradigm, managers make decisions that are politically expedient or that serve short-term personal objectives. In the new paradigm, managers make decisions that serve long-term strategic purposes.

Managerial Roles

In the old paradigm, managers primarily administer existing systems and maintain the status quo. In the new paradigm, managers challenge the status quo for strategic improvement to meet future demands. At the same time, they consistently execute existing systems to meet current demands.

Authority

In the old paradigm, managers impose authority from the top down via rules and policies. In the new paradigm, top managers still hold authority but they impose it by communicating a vision, enabling people wit systems, and empowering them to make the vision real.

Focus

In the old paradigm, managers focus on improving business results through the imposition of quotas and targets. They delegate responsibility, often without giving real authority to change broader systems that constrain results. In the new paradigm, managers focus on improving business results through improving the capabilities of systems. They focus on the means as well as the results, because they have retained responsibility for improving systems.

Control

In the old paradigm, managers control the organization through scoring individual performance, reviewing regular reports, and evaluating performance as either good or bad. In the new paradigm, managers statistically study variation to understand the causes of poor performance and make changes in systems to improve performance.

Means

In the old paradigm, managers delegate the means of improvement to staff and subordinates who must figure out how t meet established targets. In the new paradigm, managers assume responsibility for the means of improvement. They lead improvement by staff and subordinates.

The Relationship between Quality and Competitiveness

At each successive level of competition the quality of the competitors increased. A similar phenomenon happens to businesses in the marketplace. Companies that used to compete only on a local, regional, or national level now find themselves competing against companies from throughout the world. Some of these companies find the competition to be more intense than any they have ever encountered. Only those who are able to produce world-class quality can compete at this level. In practical terms, it is extremely important for a country's businesses to be able to compete globally. When they can't, jobs are lost and the quality of life in that country declines correspondingly.

Lesson # 03

INTEGRATING PEOPLE AND PERFORMANCE THROUGH QUALITY MANAGEMENT

VIEWS ON QUALITY

The total quality philosophy introduced a whole new way of looking at performance of a company through people and managing the quality of products and processes. The traditional view of quality measured process performance in defective parts per hundred produced. With total quality the same measurement is thought of I parts per million. The traditional view focused on after-the-fact inspections of products. With total quality the emphasis is on continuous improvement of products, processes, and people in order to prevent problems before they occur. The traditional view of quality saw employees as passive workers who followed orders given by supervisors and managers. It was their labor, not their brains that was wanted. With total quality, employees are empowered to think and make recommendations for continual improvement. They are also shown the control boundaries within which they must work and are given freedom to make decisions within those boundaries.

The traditional view of quality expected one improvement per year per employee. Total quality organizations expect to make at least 10 or more improvements per employee per year. Organizations that think traditionally focus on short-term profits. The total quality approach focuses on long-term profits and continual improvement.

The following statements summarize some of the major differences between the traditional view of quality and the total quality perspective:

- **Productivity versus quality.** The traditional view is that productivity and quality are always in conflict. You cannot have both. The total quality view is that lasting productivity gains are made only as a result of quality improvement.
- **How quality is defined.** The traditional view is that quality is defined solely as meeting customer specifications. The total quality view is that quality means satisfying customer needs and exceeding customer expectations.
- **How quality is measured.** The traditional view is that quality is measured by establishing an acceptable level of nonconformance and measuring against that benchmark. The total quality view is that quality is measured by establishing high-performance benchmarks for customer satisfaction and then continually improving performance.
- **How quality is achieved.** The traditional view is that quality is inspected into the product. The total quality view is that quality is determined by product design and achieved by effective control techniques.
- **Attitude toward defects.** The traditional view is that defects are an expected part of producing a product. Measuring defects per hundred is an acceptable standard. The total quality view is that defects are to be prevented using effective control systems and should be measured in defects per million (Six Sigma)
- **Quality as a function.** The traditional view is that quality is a separate function. The total quality view is that quality should be fully integrated throughout the organization – it should be everybody's responsibility.
- **Responsibility for quality.** The traditional view is that employees are blamed for quality. The total quality view is that 80 percent of quality problems are management's fault.
- **Supplier relationships.** The traditional view is that supplier relationships are short term and cost driven. The total quality view is that supplier relationships are long term and quality oriented.

Lesson #04

FUNDAMENTALS OF TOTAL QUALITY AND RATERS VIEW

Total quality–a comprehensive, organization-wide effort to improve the quality of products and service–applies not only to large manufacturers, but to small companies alike. All organization–large and small, manufacturing and service, profit and not-for-profit-can benefit from applying the principles of total quality.

During the 1990s, health care, government, and education began to pay increased attention to quality. As more public and government attention focuses on the nation's health care system, its providers turn toward quality as a means of achieving better performance and lower costs. One hospital, for example, lowered its rate of post-surgical infections to less than one-fifth of the acceptable national norms through the use of quality tools.

Although quality initiatives focused initially on reducing defects and errors in products and services through the use of measurement, statistics, and other problem-solving tools, organizations began to recognize that lasting improvement could not be accomplished without significant attention to the quality of the management practices used on a daily basis. Managers began to realize that the approaches they use to listen to customers and develop long-term relationships, develop strategy, measure performance and analyze data, reward and train employees, design and deliver products and services, and act as leaders in their organizations are the true enablers of quality, customer satisfaction, and business results. In other words, they recognized that the "quality of management" is as important as the "management of quality." As organizations began to integrate quality principles into their management systems, the notion of total quality management, or TQM, became popular. Quality took on a new meaning of organization-wide performance excellence rather than an engineering-based technical discipline.

As quality principles have matured in organizations, attention to quality as "something new" has faded, and the term "total quality management (TQM)," which was popular throughout the 1980s and early 1990s has all but fallen out of the business vernacular. Critics suggested that "TQM is as dead as a pet rock" (Business Week, June 23, 1997, p. 47). Perhaps it is unfortunate that a three-letter acronym was chosen to represent such as powerful management concept. It is equally unfortunate that people point to the demise of faddish terminology as a generalization of the concepts themselves. Reasons for failure of quality initiatives are rooted in organizational approaches and systems. As the editor of Quality Digest put it: "No, TQM isn't dead. TQM failures just prove that bad management is still alive and kicking." The most successful organizations have found that the fundamental principles of total quality are essential to effective management practice, and continue to represent a sound approach for achieving business success.

The real challenge today is to ensure that managers do not lose sight of the basic principles on which quality management and performance excellence are based. The global marketplace and domestic and international competition has made organizations around the world realize that their survival depends on high quality. Many countries, such as Korea and China, are mounting national efforts to increase quality awareness, including conferences, seminars, radio shows, school essay contests, and pamphlet distribution. Spain and Brazil are encouraging the publication of quality books in their native language to make them more accessible. These trends will only increase the level of competition in the future. Even the tools used to achieve quality a decade ago are no longer sufficient to achieve the performance levels necessary to compete in today's world. Many organizations are embracing highly sophisticated, statistically based tools as part of popular "Six Sigma" initiatives. These require increased levels of training and education for managers and frontline employees alike, as well as the development of technical staff. As Tom Engibous, president and chief executive officer of Texas Instruments commented on the present and future importance of quality in 1997: Quality will have to be everywhere, integrated into all aspects of a winning organization.

The Concept of Quality

People define quality in many ways. Some think of quality as superiority or excellence, others view it as a lack of manufacturing or service defects, still others think of quality as related to product features or price. Followings are some of many ways to look at quality.

1. perfection
2. consistency
3. eliminating waste
4. speed of delivery
5. compliance with policies and procedures
6. providing a good, usable product
7. doing it right the first time
8. delighting or pleasing customers
9. total customers service and satisfaction[6]

Today most managers agree that the main reason to pursue quality is to satisfy customers. The American National Standards Institute (ANSI) and the American Society for Quality (ASQ) define quality as ""the totality of features and characteristics of a product or service that bears on its ability to satisfy given needs." The view of quality as the satisfaction of customer needs is often called fitness for use. In highly competitive markets, merely satisfying customer needs will not achieve success. To beat the competition, organizations often must exceed customer expectations. Thus, one of the most popular definitions of quality is meeting or exceeding customer expectations.

Quality in Manufacturing

Well-developed quality systems have existed in manufacturing for some time. However, these systems focused primarily on technical issues such as equipment reliability, inspections, defect measurement, and process control. The transition to a customer-driven organization has caused fundamental changes in manufacturing practices, changes that are particularly evident in areas such as product design, human resource management, and supplier relations. Product design activities, for example, now closely integrate marketing, engineering, and manufacturing operations. Human resource practices concentrate on empowering workers to collect and analyze data, make critical operations decisions, and take responsibility for continuous improvements, thereby moving the responsibility for quality from the quality control department onto the factory floor. Suppliers have become partners in product design and manufacturing efforts. Many of these efforts were stimulated by the automobile industry, which forced their network of suppliers to improve quality.

Manufactured products have several quality dimensions including the following:

1. **Performance:** a product's primary operating characteristics.
2. **Feature:** the "bells and whistles" of a product.
3. **Reliability:** the probability of a product's surviving over a specified period of time under stated conditions of use.
4. **Conformance:** the degree to which physical and performance characteristics of a product match pre-established standards.
5. **Durability:** the amount of use one gets from a product before it physically deteriorates or until replacement is preferable.
6. **Serviceability:** the ability to repair a product quickly and easily.
7. **Aesthetics:** how a product looks, feels, sounds, tastes, or smells.
8. **Perceived quality:** subjective assessment resulting from image, advertising, or brand names.

Most of these dimensions revolve around the design of the product.

Quality control in manufacturing is usually based on conformance, specifically conformance to specifications. Specifications are targets and tolerances determined by designers of products and services. Targets are the ideal values for which production strives; tolerances are acceptable deviations from these ideal values. For example, a computer chip manufacturer might specify that the distance between pins on a computer chip should be 0.095 $\pm$ 0.005 inches. The value 0.090 and 0.100 would be acceptable.

Quality in Services

Service can be defined as "any primary or complementary activity that does not directly produce a physical product–that is, the non goods part of the transaction between buyer (customer) and seller (provider)." A service might be as simple as handling a complaint or as complex as approving a home mortgage. Service organizations include hotels; health, legal, engineering, and other professional services; educational institutions; financial services; retailers; transportation; and public utilities.

Today services account for nearly 80 percent of the U.S., Singapore and Sweden workforce. The importance of quality in services cannot be underestimated, as statistics from a variety of studies reveals:

- The average company never hears from more than 90 percent of its unhappy customers. For every complaint it receives, the company has at least 25 customers with problems, about one-fourth of which are serious.
- Of the customers who make a complaint, more than half will do business again with that organization is their complaint is resolved. If the customer feels that the complaint was resolved quickly, this figure jumps to about 95 percent.
- The average customer who has had a problem will tell nine or ten others about it. Customers who have had complaints resolved satisfactorily will only tell about five others.
- It costs six times more to get a new customer than to keep a current customer.

So why do many companies treat customers as commodities? In Japan the notion of customer is equated with "honored guest." Service clearly should be at the forefront of a firm's priorities.

The service sector began to recognize the importance of quality several years after manufacturing had done so. This can be attributed to the fact that service industries had not confronted the same aggressive foreign competition that faced manufacturing. Another factor is the high turnover rate in service industry jobs, which typically pay less than manufacturing jobs. Constantly changing personnel makes establishing a culture for continuous improvement more difficult.

The production of services differs from manufacturing in many ways, and these differences have important implications for managing quality. The most critical differences are:

1. Customer needs and performance standards are often difficult to identify and measure, primarily because the customers define what they are, and each customer is different.
2. The production of services typically requires a higher degree of customization than does manufacturing. Doctors, lawyers, insurance salespeople, and food-service employees must tailor their services to individual customers. In manufacturing, the goal is uniformity.
3. The output of many service systems is intangible, whereas manufacturing produces tangible, visible products. Manufacturing quality can be assessed against firm design specifications, but service quality can only be assessed against customers' subjective, nebulous expectations and past experiences. Manufactured goods can be recalled or replaced by the manufacturer, but poor service can only be followed up by apologies and reparations.
4. Services are produced and consumed simultaneously, whereas manufactured goods are produced prior to consumption. In addition, many services must be performed at the

convenience of the customer. Therefore, services cannot be stored, inventoried, or inspected prior to delivery as manufactured goods are. Much more attention must therefore be paid to training and building quality into the service as a means of quality assurance.

5. Customers often are involved in the service process and present while it is being performed, whereas manufacturing is performed away from the customer. For example, customers of a quick-service restaurant pace their own orders, carry their food to the table, and are expected to clear the table when they have finished eating.
6. Services are generally labor intensive, whereas manufacturing is more capital intensive. The quality of human interaction is a vital factor for services that involve human contact. For example, the quality of hospital care depends heavily on interactions among the patients, nurses, doctors, and other medical staff. Hence, the behavior and morale of service employees is critical in delivering a quality service experience.
7. Many service organizations must handle very large numbers of customer transactions. For example, on a given business day, the National Bank of Pakistan might process more than 5.5 million transactions for 7.5 million customer through 1,600 branches and more than 3,500 banking machines, and TCS or Fed Ex might handle more than 1.5 million shipments across the globe. Such large volumes increase the opportunity for error.

These differences have made it difficult for many service organizations to apply total quality principles.

Many service organization have well-developed quality assurance systems. Most of them, however, are based on manufacturing analogies and tend to be more product-oriented than service-oriented. Many of the key dimensions of product quality apply to services. For instance, “on time arrival” for an airline is a measure of service performance; frequent flyer awards and “business class” sections represent features. A typical hotel’s quality assurance systems focus on technical specifications such as properly made-up rooms. However, service organizations have special requirements that manufacturing systems cannot fulfill. The most important dimensions of service quality include the following; you may remember the most important ones by **RATER:**

- **Reliability**: How much reliable is the service provider?
- **Accessibility and convenience**: Is the service easy to obtain?
- **Timeliness**: Will a service be performed when promised?
- Completeness: Are all items in the order included?
- Consistency: Are services delivered in the same fashion for every customer, and every time for the same customer?
- **Tangibility**: after the service is over, is there any thing to take home to remind the service experience?
- **Empathy** or Courtesy: Do frontline employees greet each customer cheerfully?
- **Responsiveness**: Can service personnel react quickly and resolve unexpected problems?

Service organizations must look beyond product orientation and pay significant attention to customer transactions and employee behavior. Several points that service organizations should consider are as follows:

- The quality characteristics that a firm should control may not be the obvious ones. Customer perceptions are critical although it may be difficult to define what the customer wants. For example, speed of service is an important quality characteristic, yet perceptions of speed may differ significantly among different service organization and customers. Marketing and consumer research can play a significant role.
- Behavior is a quality characteristic. The quality of human interaction is vital in every transaction that involves human contact. For example, banks have found that the friendliness of tellers is a principal factor in retaining depositors.
- Image is a major factor in shaping customer expectations of a service and in setting standards by which customers evaluate that service. A breakdown in image can be as harmful as a breakdown in

delivery of the service itself. Top management is responsible for shaping and guiding the image that the firm projects.

- Establishing and measuring service levels may be difficult. Service standards, particularly those relating to human behavior, are often set judgmentally and are hard to measure. In manufacturing, it is easy to quantify output, scrap, and rework. Customer attitudes and employee competence are not as easily measured.
- Quality control activity may be required at times or in places where supervision and control personnel are not present. Often work must be performed at the convenience of the customer. This calls for more training of employees and self-management.

These issues suggest that the approach to managing quality in services differs from that used in manufacturing. However, manufacturing can be seen as a set of interrelated services, not only between the company and the ultimate consumer, but within the organization. Manufacturing is a customer of product design; assembly is a customer of manufacturing; sales are a customer of packaging and distribution. If quality is meeting and exceeding customer expectations, then manufacturing takes on a new meaning, far beyond product orientation. Total quality provides the umbrella under which everyone in the organization can strive to create customer satisfaction.

Quality in ICT Sector

Quality in IT and IS was taken seriously only after SW Engineering principles were established. SWE Institute at CM University developed the CMM levels to indicate the maturity levels of an organization taking care of RATER along with issues of Configuration Management, Verification and Validation issues along with Scalability and Reusability issues.

Principles of Total Quality

A definition of total quality was endorsed in 1992 by the chairs and CEOs of nine major U.S. corporations in cooperation with deans of business and engineering departments of major universities, and recognized consultants:

Total Quality (TQ) is a people-focused management system that aims at continual increase in customer satisfaction at continually lower real cost. TQ is a total system approach (not a separate area or program) and an integral part of high-level strategy; it works horizontally across functions and departments, involves all employees, top to bottom, and extends backward and forward to include the supply chain and the customer chain. TQ stresses learning and adaptation to continual change as keys to organizational success.

The foundation of total quality is philosophical: TQ includes systems, methods, and tools. The systems permit change; the philosophy stays the same. TQ is anchored in values that stress the dignity of the individual and the power of community action.

There probably are as many different approaches to TQ as there are businesses. However, most share some basic elements: (1) customer focus, (2) a process orientation, (3) continuous improvement and learning, (4) empowerment and teamwork, (5) management by fact, and (6) leadership and strategic planning.

Customer Focus

The customer is the judge of quality. Understanding customer needs, both current and future, and keeping pace with changing markets requires effective strategies for listening to and learning from customers, measuring their satisfaction relative to competitors, and building relationships, Customer needs–particularly differences among key customer groups – must be linked closely to an

organization's strategic planning, product design, process improvement, and workforce training activities. Satisfaction and dissatisfaction information are important because understanding them leads to the right improvements that can create satisfied customers who reward the company with loyalty, repeat business, and positive referrals. Creating satisfied customers includes prompt and effective response and solutions to their needs and desires as well as building and maintaining good relationships. A business can achieve success only by understanding and fulfilling the needs of customers. From a total quality perspective, all strategic decisions a company makes are "customer-driven." In other words, the company shows constant sensitivity to emerging customer and market requirements. This requires an awareness of developments in technology and rapid and flexible response to customer and market needs.

Customer-driven firms measure the factors that drive customer satisfaction. A company close to its customer knows what the customer wants, how the customer uses its products, and anticipates the needs that the customer may not even by able to express. It also continually develops new techniques to obtain customer feedback. Customer opinion surveys and focus groups can help companies understand customer requirements and values. Some companies require their sales and marketing executives to meet with random group of key customers on a regular basis. Other companies bring customers and suppliers into internal product design and development meetings.

A firm also must recognize that internal customers–the recipients of any work output, such as the next department in a manufacturing process or the order-picker who receives instructions from an order entry clerk – are as important in assuring quality as are external customers who purchase the product. Failure to meet the needs of internal customers will likely affect external customers. Employees must view themselves as customers of some employees and suppliers to others. Employees who view themselves as both customers of and suppliers to other employees understand how their work links to the final product. After all, the responsibility of any supplier is to understand and meet customer requirements in the most efficient and effective manner possible.

Customer focus extends beyond the consumer and internal relationships, however. Society represents an important customer of business. A world-class company, by definition, is an exemplary corporate citizen. Business ethics, public health and safety measures, concern for the environment, and sharing quality-related information in the company'' business and geographic communities are required. In addition, company support–within reasonable limits of its resources–of national, industry, trade, and community activities and the sharing of nonproprietary quality-related information demonstrate far-reaching benefits.
Customers may be of following types:

1. External Customer
2. Internal Customer
3. Investor Customer
4. Social or Society Customer

Process Orientation

The traditional way of viewing an organization is by surveying the vertical dimension – by keeping an eye on an organization chart. However, work gets done (or fails to get done) horizontally or cross-functionally, not hierarchically. A process is a sequence of activities that is intended to achieve some result. According to AT&T, a process is how work creates value for customers. We typically think of processes in the context of production: the collection of activities and operations involved in transforming inputs-physical facilities, materials, capital, equipment, people, and energy-into outputs-products and services. Common types of production processes include machining, mixing, assembly, filling orders, or approving loans. However, nearly every major activity within an organization involves a process that crosses traditional organizational boundaries. For example, an order fulfillment process might involve a salesperson placing the order; a marketing representative entering it on the company'

computer system; a credit check by finance; picking, packaging, and shipping by distribution and logistics personnel; invoicing by finance; and installation by field service engineers. A process perspective links all necessary activities together and increases one's understanding of the entire system, rather than focusing on only a small part. Many of the greatest opportunities for improving organizational performance lie in the organizational interfaces – those spaces between the boxes on an organization chart.

Continuous Improvement and Learning

Continuous improvement is part of the management of all systems and processes. Achieving the highest levels of performance requires a well-defined and well-executed approach to continuous improvement and learning. "Continuous improvement" refers to both incremental and "breakthrough" improvement. Improvement and learning need to be embedded in the way an organization operates. This means they should be a regular part of daily work, seek to eliminate problems at their source, and be driven by opportunities to do better as well as by problems that need to be corrected. Improvements may be of several types:

- Enhancing value to the customer through new and improved products and services;
- Improving productivity and operational performance through better work processes and reductions in errors, defects, and waste; and
- Improving flexibility, responsiveness, and cycle time performance.

Management by Fact

Organizations needs performance measures for three reasons:

- To lead the entire organization in a particular direction; that is, to drive strategies and organizational change,
- To manage the resources needed to travel in this direction by evaluating the effectiveness of action plans, and
- To operate the processes that make the organization work and continuously improve.[21]

Data and information support analysis at all organizational levels. The types of information and how it is disseminated and aligned with organizational levels are equally vital to success. At the work level, data provide real-time information to identify assignable reasons for variation, determine root causes, and take corrective action as needed. This might require lean communication a channel consisting of bulletins, computerized quality reports, and digital readouts of part dimensions to provide immediate information on what is happening and how things are progressing. At the process level, operational performance data such as yields, cycle times, and productivity measures help manager determine whether they are doing the right job, whether they are using resources effectively, and whether they are improving. Information at this level generally is aggregated; for example daily or weekly scrap reports, customer complaint data obtained from customer service representatives or monthly sales and cost figures faxed in from field offices. At the organization level, quality and operational performance data from all areas of the firm, along with relevant financial, market, human resources, and supplier data, form the basis for strategic planning and decision making. Such information is highly aggregated and obtained from many different sources throughout the organization.

A company should select performance measures and indicator that best represent the factor that lead to improved customer, operational, and financial performance. These typically include

- Customer satisfaction,
- Product and service performance,
- Market assessments,
- Competitive comparisons,

- Supplier performance,
- Employee performance, and
- Cost and financial performance.

A comprehensive set of measures and indicators tied to customer and company performance requirements provides a clear basis for aligning all activities of the company with its goals.

Leadership and Strategic Planning

Leadership for quality is the responsibility of top management. Senior leadership must set directions; create a customer orientation, clear quality values, and high expectations that address the needs of all stakeholders; and build them into the way the company operates. Senior leaders need to commit to the development of the entire workforce and should encourage participation, learning, innovation, and creativity throughout the organization. Reinforcement of the values and expectations requires the substantial personal commitment and involvement of senior management. Through their personal roles in planning, reviewing company quality performance, and recognizing employees for quality achievement, the senior leaders serve as role models, reinforcing the values and encouraging leadership throughout the organization.

If commitment to quality is not a priority, any initiative is doomed to failure. Lip service to quality improvement is the kiss of death. Many companies have a corporate quality council made up of top executives and managers, which sets quality policy and reviews performance goals within the company. Quality should be a major factor in strategic planning and competitive analysis processes.

Many of the management principles and practices required in a TQ environment may be contrary to long-standing practice. Top managers, ideally starting with the CEO, must be the organization's TQ leaders. The CEO should be the focal point providing broad perspectives and vision, encouragement, and recognition. The leader must be determined to establish TQ initiatives and committed to sustain TQ activities through daily actions in order to overcome employees' inevitable resistance to change.

Unfortunately, many organizations do not have the commitment and leadership of their top managers. This does not mean that these organizations cannot develop a quality focus. Improved quality can be fostered through the strong leadership of middle managers and the involvement of the workforce. In many cases, this is where quality begins. In the long run, however, an organization cannot sustain quality initiatives without strong top management leadership.

Achieving quality and market leadership requires a strong future orientation and a willingness to make long-term commitments to key stakeholders-customers, employees, suppliers, stockholders, the public, and the community. Strategic business planning should be the driver for quality excellence throughout the organization and needs to anticipate many changes, such as customer's expectations, new business and partnering opportunities, the global and electronic marketplaces, technological developments, new customer segments, evolving regulatory requirements, community / societal expectations, and strategic changes by competitors. Plans, strategies, and resource allocations need to reflect these influences. Improvements do not happen overnight. The success of market penetration by Japanese manufacturers evolved over several decades.

Lesson# 05

TOTAL QUALITY MANAGEMENT AND GLOBAL COMPETITIVE ADVANTAGE

Bringing TQ to Life at ABC Engineering Company:

ABC is a contract manufacturer of precision sheet metal and machined components for telecommunications semi-conductor, and medical equipment industries. Some of the ways it exemplifies the principles of TQ are described below.

Customer Focus

ABC made a strategic decision to carefully select customers that support its values–particularly a systematic approach to business and performance management, desire for long-term partnerships, and global leadership. Management and Tam Leaders work with each customer to establish current requirements and future needs, and each customer is assigned a three-person Customer Service team that is on call 24 hours a day for day-to-day production issues.

Process Orientation

Processes such as prototype development, scheduling, production setup, fabrication, assembly, and delivery have process owners responsible for maintaining the process to customer requirements. A Quality Assurance team member works with manufacturing teams to create process documentation.

Continuous Improvement and Learning

Teams use a structured approach to evaluate and improve their processes, documenting them, and presenting a status report of improvements to senior leaders and the ABC Steering Committee. Teams benchmark competitors, “best practice” companies, and customers to learn from others.

Empowerment and Teamwork

Production and delivery processes are designed around cell manufacturing. Teams are responsible for knowing their customer’s requirements and producing according to those requirements. Teams are empowered to change targets recommended during strategic planning if they believe it will help them achieve higher performance, as well as to schedule work, manage inventory, and design the layout of their work areas.

Management by Fact

Team analyzes defect data, customer-reported problems, and control charters generated during production to identify problems and opportunities for improvement. Every business goal and project has defined methods for measurement, and senior leaders meet weekly to review company performance and ensure alignment with directions and plans.

Leadership and Strategic Planning

Senior Executive Leaders. (SELs) and the Leadership Committee (LC) set the strategic direction of the company, and communicate and reinforce values and expectations through performance reviews, participation in improvement or strategic projects, regular interactions with customers and team members, and recognition of team member achievements.
All this has contributed to an annual average increase in sales growth of 35 percent from 1995 to 2000, and high levels of customer and employee satisfaction, and quality and operational performance.

TQM and Strategic Focus

The nature of TQ differs from common management practices in many respects.

1. Strategic Planning and Management

In traditional management, financial and marketing issues such as profitability, return on investments, and market share drive strategic planning. Quality planning activities are delegated to the "quality control" department. Long-term quality initiatives are viewed as being costly and not contributing to the ultimate performance measure – profit. Quality planning and strategic business planning are indistinguishable in TQ. Quality goals are the cornerstone of the business plan. Measures such as customer satisfaction, defect rates, and process cycle times receive as much attention in the strategic plan as financial and marketing objectives.

2. Changing Relationship with Customers and Supplier

In traditional management, quality is defined as adherence to internal specifications and standards. Quality is defined as adherence to internal specifications and standards. Quality is measured only by the absence of defects. Inspection of people's work by others is necessary to control defects. In TQ, quality is defined as products and services beyond present needs and expectations of customers. Innovation is required to meet and exceed customers' needs.

Traditional management places customers outside of the enterprise and within the domain of marketing and sales. TQ views everyone inside the enterprise as a customer of an internal or external supplier, and a supplier of an external or internal customer. Marketing concepts and tools can be used to assess internal customer needs and to communicate internal supplier capabilities.

3. Organizational Structure

Traditional management views an enterprise as a collection of separate, highly specialized individual performers and units, loosely linked by a functional hierarchy. Lateral connections are made by intermediaries close to the top of the organization. TQ views the enterprise as a system of interdependent processes, linked laterally over time through a network of collaborating (internal and external) suppliers and customers. Each process is connected to the enterprise's mission and purpose through a hierarchy of micro-and macro processes. Every process contains sub processes and is also contained within a higher process. This structure of processes is repeated throughout the hierarchy.

4. Organizational Change

Once a traditional organization has found a formula for success, it keeps following ti. Management's job is to prevent change, to maintain the status quo. In TQ the environment in which the enterprise interacts is changing constantly. If the enterprise continues to do what it has done in the past, its future performance relative to the competition will deteriorate. Management's job, therefore, is to provide the leadership for continual improvement and innovation in processes and systems, products, and services. External change is inevitable, but a favorable future can be shaped.

5. Team work

In traditional management, individuals and departments work for themselves. Individuals are driven by short-term performance measures, have narrowly defined jobs, and rarely see how they fit into the whole process or system. Little communication and cooperation exists between design and manufacturing, manufacturing and marketing, and sales / service and design. In TQ individuals cooperate in team structures such as quality circles, steering committees, and self-

directed work teams. Departments work together toward system optimization through cross-functional teamwork.

The adversarial relationship between union and management is inevitable in traditional management. The only room for negotiation is in areas such as wages, health, and safety. In TQ the union is a partner and a stakeholder in the success of the enterprise. The areas for partnership and collaboration are broad, particularly in education, training, and meaningful involvement of employees in the improvement of processes that they affect and that affect their work.

6. Motivation and Job Design

Motivation untraditional management is often akin to McGregor's Theory X model of motivation: worker dislike work and require close supervision and control. TQ organizations support the premise of Theory Y: workers are self-motivated, seek responsibility, and exhibit a high degree of imagination and creativity at work. TQ managers provide leadership rather than overt intervention in the processes of their subordinates, who are viewed as process managers rather than functional specialists. People are motivated to make meaningful contributions to what they believe is an important and noble cause, of value to the enterprise and society.

In traditional management, competition is inevitable and inherent in human nature. Performance appraisal, recognition, and reward systems place people in an internally competitive environment. Individualism is reinforced to the detriment of teamwork. Competitive behavior – one person against another or one group against another – is not a natural state in TQ. TQ reward systems recognize individual as well as team contributions and reinforce cooperation.

7. Management and Leadership

Traditional management views people as interchangeable commodities, developed to meet the perceived needs of the enterprise. People are passive contributors with little autonomy-doing what they are told and nothing more. TQ views people as the enterprise's true competitive edge. Leadership provides people with opportunities for personal growth and development. People are able to take pride and joy in learning and accomplishment, and the ability of the enterprise to succeed is enhanced. People are active contributors, valued for their creativity and intelligence. Every person is a process manager presiding over the transformation of inputs to outputs of greater value to the enterprise and to the ultimate customer.

Competitive Advantage on basis of Quality Strategy

- A firm has many options in defining its long-terms goals and objectives, the customers it wants to serve, the products and services it produces and delivers, and the design of the production and service system to meet these objectives. Strategic planning is the process by which the members of an organization envision its future and develop the necessary procedures and operations to carry out that vision. Strategy – the result of strategic planning – is the patter of decisions that determines and reveals a company's goals, polices, and plans to meet the needs of its stakeholders. An effective strategy allows a business to create a sustainable competitive advantage.

Quality as a Strategy

The concept of strategy has different meanings to different people. James Brian Quinn characterizes strategy as follows:

A strategy is a pattern or plan that integrates an organization's major goals, policies, and action sequences into a cohesive whole. A well formulated strategy helps to marshal and allocate an

organization's resources into a unique and viable posture based on its relative internal competencies and shortcomings, anticipated changes in the environment, and contingent moves by intelligent opponents.

Formal strategies contain three elements:

1. Goals to be achieved,
2. Policies that guide or limit action, and
3. Action sequences, or programs, that accomplish the goals.

Effective strategies develop around a few key concepts and thrusts that provide focus. The essence of strategy is t build a posture that is so strong in selective ways that the organization can achieve its goals despite unforeseeable external forces that may arise.

The traditional focus of business strategies has been finance and marketing. These parallel two of the principal sources of competitive advantage i.e. cost and differentiation. Total quality – with a focus on people – leads t improvements in both areas. Therefore, quality can be viewed as a strategy in itself.

The role of quality in business strategy has taken two significant steps since 1980. First, many firms have recognized that a strategy driven by quality can lead to significant market advantages. Second, the lines between quality strategy and generic business strategies have become blurred to the point where TQ principles are integrated into most businesses' normal business planning; that is, TQ is a basic operating philosophy that provides the foundation for effective management

For most companies, integration of TQ into strategic business planning is the result of a natural evolution. For most new companies – or those that have enjoyed a reasonable measure of success – quality takes a back seat to increasing sales, expanding capacity, or boosting production. Strategic planning usually focuses on financial and marketing strategies.

As a company begins to face increasing competition and rising consumer expectations, cost-cutting objectives take precedence. Some departments or individuals may champion quality improvement efforts, but quality is not integrated in the company's strategic business plan. In the face of market crises, which many U.S. firms experienced in the 1970s and 1980s, top management begins to realize the importance of quality as a strategic operating policy. In many cases, however, quality is considered separate from financial and marketing plans. Companies that aspire to world-class status reach the highest level of evolution where quality becomes an integral part of the overall strategic plan and is viewed as a central operating strategy.

Competitive advantage denotes a firm's ability to achieve market superiority over its competitors. In the long run, a sustainable competitive advantage provides above-average performance. A strong competitive advantage has six characteristics:

1. It is driven by customer wants and needs. A company provides value to its customers that competitors do not.
2. It makes a significant contribution to the success of the business.
3. It matches the organization's unique resources with the opportunities in the environment. No two companies have the same resources; a good strategy uses them effectively.
4. It is durable and lasting and difficult for competitors to copy. A superior research and development department, for example, can consistently develop new products or processes to remain ahead of competitors.
5. It provides a basis for further improvement.
6. It provides direction and motivation to the entire organization.

As each of these characteristics relates to quality, quality can be an important means of gaining competitive advantage. Let us see how total quality contributes to competitive advantage.

- Discuss cost leadership, differentiation, and people as principal sources of competitive advantage, and their relationship to quality;
- Relate quality to the achievement of higher profitability;
- Describe the importance of quality in meeting customer expectations in product design, service, flexibility and variety, innovation, and rapid response; and
- Discuss empirical results showing the impact of quality on business results.

Sources of Competitive Advantage

The classic literature on competitive strategy suggests that a firm can posses' two basic types of competitive advantage: low cost and differentiation.

Cost Leadership

Many firms gain competitive advantage by establishing themselves as the low-cost leader in an industry. These firms produce high volumes of mature products and achieve their competitive advantage through low prices. Such firms often enter markets that were established by other firms. They emphasize achieving economies of scale and finding cost advantages from all sources. Low cost can result from high productivity and high capacity utilization. More importantly, improvements in quality lead to improvements in productivity, which in turn lead to lower costs. Thus a strategy of continuous improvement is essential to achieve a low-cost competitive advantage.

To achieve cost leadership for high volume products, companies use a variety of approaches:

- Early manufacturing involvement in the design of the product both for make-versus-buy decisions and for assurance that the production processes can achieve required tolerances.
- Product design to take advantage of automated equipment by minimizing the number of parts, eliminating fasteners, making parts symmetric whenever possible, avoiding rigid and stiff parts and using one-sided assembly designs.
- Limited product models and customization in distribution centers rather than in the factory.
- A manufacturing system designed for a fixed sequence of operations. Every effort is made to ensure zero defects at the time of shipment. Work-in-process inventory is reduced as much as possible, and multi skilled, focused teams of employees are used.

A cost leader can achieve above-average performance if it can command prices at or near the industry average. However, it cannot do so with an inferior product. The product must be perceived as comparable with competitors or the firm will be forced to discount prices well below competitors' prices to gain sales. This can cancel any benefits that result from cost advantage.

Differentiation

To achieve differentiation, a firm must be unique in its industry along some dimensions that are widely valued by customers. It selects one or more attributes that customers perceive as important and positions itself uniquely to meet those needs. For instance, Dell's direct business model was the first of its kind in the computer industry and continues to be a principal source of the company's success.

Often, a firm with a differentiation strategy can command premium prices and achieve higher profits. Juran cites an example of a power tool manufacturer that improved reliability well beyond that of competitors. Field data showing that the differences in reliability resulted in significantly lower operating cost were publicized, and the company was able to secure a premium price.

However, a firm that uses differentiation as its source of competitive advantage must make its products or systems difficult to copy. Often this involves culture, habits, and sunk costs. For example, why

doesn't every company copy Dell's superior direct business model? Dell's approaches are hardly a secret; even Michael Dell has written a book about it. Competitors have copied its Web site with stunning precision, but they face far greater difficulty copying the supporting activities–purchasing, scheduling, and logistics–that Dell has built around its direct model over several decades. Competitors are burdened by long-standing relationships with suppliers and distributors and by a different culture.[7]

People

The competitive advantage resulting from an organization's people can drive low cost and differentiation. For example, over several decades, Southwest Airlines has been the most profitable U.S. carrier. It has fewer employees per aircraft and flies more passengers per employee. Much of its cost advantage comes from its very productive, motivated, and unionized workforce.[9] Is its competitive advantage low cost, or is it the people? It would appear that the real driver of Southwest's competitive advantage is its people. Herb Kelleher, former CEO, once stated, "It's the intangibles that are the hardest things for competitors to imitate. You can get on an airplane. You can get ticket-counter space, you can get baggage conveyors. But it is our esprit de corp.–the culture, the spirit–that is truly our most valuable competitive asst." Providing a work environment that foster cooperation, initiative, and innovation; educating and training the workforce; and enhancing the factors that affect well-being, satisfaction, and motivation are very difficult for competitors to copy. This is a significantly different philosophy from the work environment that came into being during the Industrial Revolution.

The Importance of Quality to Competitive Advantage

The role of quality in achieving competitive advantage was demonstrated by several research studies during the 1980s. PIMS Associates, Inc., a subsidiary of the Strategic Planning Institute, maintains a database of 1,200 companies and studies the impact of product quality on corporate performance.11 PIMS researchers have found that

- Product quality is the most important determinant of business profitability.
- Business offering premium quality products and services usually have large market shares and were early entrants into their markets.
- Quality is positively and significantly related to a higher return on investment for almost all kinds of products and market situations. PIMS studies have shown that firms with products of superior quality can more than triple return on sales over products perceived as having inferior quality.
- A strategy of quality improvement usually leads to increased market share, but at a cost in terms of reduced short-run profitability.
- High quality producers can usually charge premium prices.

The value of product in the marketplace is influenced by the quality of its design. Improvements in performance, features, and reliability will differentiate the product from its competitors, improve a firm's quality reputation, and improve the perceived value of the product. This allows the company to command higher prices and achieve an increased market share. This, in turn, leads to increased revenues that offset the added costs of improved design and provides sustainable basis for the competitive advantage.

Lesson #0 6

TOTAL QUALITY MANAGEMENT AND PLANNING FOR QUALITY AT OFFICE

Total Quality Management is an organization wide process based on:

- best use of the resources of the total organization
- organizational flexibility and response to change
- defined internal and external customer/supplier relationships embracing:
  - external customers
  - internal customers
  - external suppliers
  - internal suppliers

Bound together in long term business relationships

- Measurement of performance. The standard is the "agreed customer requirement "and the required performance is
  - absolute conformance to agreed customer requirements
  - customer satisfaction
  - process efficiency
  - anticipating customer needs and expectations
  - delivering products and services that delight customers
  - benchmarking - identifying and adopting world-wide best practice
  - measuring and monitoring continuous improvement

TQM principles provide a framework and model how to spend the time in organizations to do the quality work. Conducting meetings and making decision is also one the important task of managers.

Now we are going to discuss in detail the nine basics steps which professional managers can use in their meetings in order to improve the performance and productivity .After implementing these basic skills in any organization company can save their valuable and precious time and can come to conclusion easily.

Nine Discussion Skills

1. Open the discussion
2. Listen
3. Ask for clarification
4. Manage participation
5. Summarize
6. Manage time
7. Contain digressions
8. Test for agreement
9. Close the discussion

Lesson # 07

LEADERS IN QUALITY REVOLUTION AND DEFINING FOR QUALITY

The Concept AND Definition of Quality

While managers have shown interest in the concept of quality, many have been frustrated by its elusiveness. They find diverse and often conflicting definitions in professional books, journals, and news media. Despite common themes such as continuous improvement, customer focus, and excellence, different people emphasize different things. For example, in a 1991 public television special, "Quality or Else," executives, managers, workers, academics, and others defined quality variously as follows:

- A pragmatics system of continual improvement, a way to successfully organize man and machines.
- The meaning of excellence
- The unyielding and continuing effort by everyone in an organization to understand, meet, and exceed the needs of its customers
- The best product that you can produce with the materials that you have to work with
- Continuous good product which a customer can trust.
- Producing a product or service that meets the needs or expectations of the customers.
- Not only satisfying customers, but delighting them, innovating, creating.

Your own sample of definitions would probably reveal similar variety. Different companies, and different people within the same company, often disagree on the definition of quality. Sometimes the disagreement is merely due to semantics. Sometimes they are the result of focusing on different dimensions of quality. Other times the differences are more profound, implying conflicting courses of action and approaches to management. Here we look at several views of quality and then offer a definition that should help to integrate managerial efforts to improve quality throughout an organization.

The Transcendent View of Quality

The concept of quality has often been defined, from a transcendent view, as "innate excellence". This view implies that high quality is something timeless and enduring, an essence that transcends or rises above individual tastes or styles. It often regards quality as an un-analyzable property that people learn to recognize through experience, just as Plato argued that beauty can be understood only after exposure to a series of objects that display its characteristics.

A Critique of the Transcendent View of Quality

Walter A. Shewhart, the father of modern-day statistical quality control, offered the following criticism of the transcendent view of quality:

Dating at least from the time of Aristotle, there has been some tendency to conceive of quality as indicating the goodness of an object. The majority of advertisers appeal t the public upon the basis of the quality of product. In so doing, they implicitly assume that there is a measure of goodness which can be applied to all kinds of product, whether it be vacuum tubes, sewing machines automobiles.

The transcendent view of quality essentially tells a manager "you will know it when you see it" and does not inform managers how to pursue excellence. Certainly the notion of excellence is an important and inspirational component of quality. However, future managers must have a better understanding of the concept. The definition of quality must be more pragmatic, more objective, and more tangible. It must inform managers about how to make improvements.

To better understand how this total views of quality impacts managerial practices, it is useful to understand how managerial approaches to quality have evolved from a narrow view, focused on

inspection and conformance to specified standards, toward a broader view, focused on organizational strategy for providing superior customer value. We now discuss the evolution of quality approaches.

Product-Based

Shewhart explains that the word "quality," in Latin, qualities, comes from quails, meaning "How constituted" and signifies a thing's basic nature. Emphasizing a product-based view of quality, Shewhart argued that the quality of a manufactured product may be described in terms of a set of characteristics. Product-based definitions of quality suit engineers because they are concerned with translating product requirements into specific components and physical dimensions that can be produced. For example, measurement of capacity, inductance, and resistance may be used to define the quality of a relay. So, according to this view, quality is a precise and measurable variable: differences in quality reflect differences in the quantity of an attribute the product possess (Garvin, 1988). For example, high-quality rugs have a large number of knots per square inch. Quality in a rug can be seen as an inherent characteristic that can be assessed objectively. Since quality reflects the quantity of attributes contained by a product, and because attributes are costly to produce, high quality means higher cost. In this view, a Cadillac loaded with a number of amenities is a higher-quality car than a stripped-down Chevrolet.

The product-based view has some merit, but it does not accommodate differences in individual tastes and preferences.

Manufacturing-Based

Another meaning of the word "quality" is "the degree of excellence that a thing possess" once it is manufactured. The manufacturing-based view of quality focuses on manufacturing and engineering practices, emphasizes conformance to specified requirements, and relies on statistical analysis to measure quality. As you will see, it contradicts the notion that higher quality necessarily corresponds to higher cost. Returning to the example of a relay, Shewhart suggests the overall quality of a relay can be further expressed in terms of whether it meets engineering specifications for product-based characteristics (qualities), such as capacity, inductance, and resistance. To simplify, let's just consider two dimensions, resistance and inductance.

The quality or degree of excellence of a product (represented by a point or a set of two measurements) falling within the rectangular region would be characterized as good or satisfactory. A product with quality outside the region, not conforming to satisfactions, would be characterized as bad or unsatisfactory. Of course, real manufacturing processes produce a stream of products. Ideally, each individual product has quality that conforms to specification. However, variation in the production process may produce some products that are outside the specifications.

Shewhart suggested that the fraction of nonconforming items produced by a manufacturing process can be studied statistically to assess quality. The knowledge gained from statistical studies can be used to improve the control of quality, thus ensuring that a larger fraction of the products conform to specification. By stabilizing and reducing variation in the process, managers can ensure that product quality is always within specification. Such improvement would mean fewer defects, les scrap, less rework, and consequently, less cost.

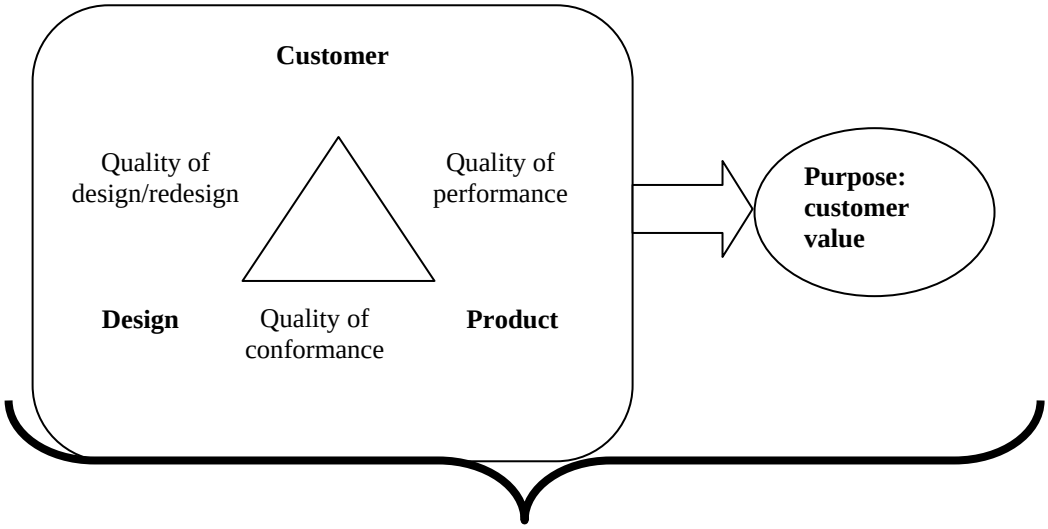
User-Based

The user-based perspective does not abandon manufacturing quality as a strategic objective, but provides a context for it. As Shewhart says, "The broader concept of economic control naturally includes the problem of continually shifting the standards expressed in terms of measurable physical properties to meet best the shifting economic value of these particular physical characteristics depending upon shifting human wants". The *user-based view of quality,* popular with people in marketing, presumes that quality rests in "the eye o the beholder," the user of the product, rather than an engineer's specified standards.

The Concept of Customer Value

Value-based approaches expand on the user-based view f quality by incorporating the notion of "price of costs." Regarding value-based approaches, Garvin (1988) suggests "a quality product is one that provides performance or conformance at an acceptable price or cost. By this reasoning, a $ 500 running shoe, no matter how well-constructed, could not be a quality product, for it would find few buyers." In support of this view, researchers have demonstrated a positive relationship between market share and value-based measures of quality. Other examples contradict this value-based approach which assumes that lower cost always means higher value to the customer. Designer dresses that sell for $5,000, or luxury cars that cost more than a home, suggest that there is another dimension of value. The definition of customer value offered below expands on this value-based definition of quality. In fact, the customer value concept encompasses all of the foregoing definitions of quality.

Quality improvement for customer value



Apply Quality improvement

Process throughout

We define customer value as a combination of benefits and sacrifices occurring when a customer uses a product or service to meet certain needs. Those consequences that contribute to meeting one's needs are benefits, while those consequences that detract from meeting one's needs are sacrifices.

For example, a person who purchases a large luxury car to satisfy a need for pleasurable travel might enjoy such benefits as comfort, restfulness, and audio entertainment. On the other hand, the person also has to make certain sacrifices, such as paying for the vehicle, difficulties in parking a large vehicle, and fuel and maintenance costs these sacrifices detract from meeting customer needs. For example, if the car owner lives in a town that doesn't have a dealership for the luxury car, he or she will incur costs such as frustration, time, and the inconvenience of going to another town for service.

The concept of customer value encompasses the benefits and sacrifices associated with the customer's use process throughout the life cycle of product ownership. As Deming (1986) suggests: "Quality must be measured by the interaction between three participants: "Quality must be measured by the interaction between three participants: (1) the product itself; (2) the user and how he uses the product, how he

installs it, how he takes care of it; and (3) instructions for use, training of customer and training of repairman, service provided for repairs, and availability of parts."

The concept of customer value also encompasses all the definitions of quality mentioned so far. To provide value to customers, managers must ensure the following:

1. **Quality of Design/Redesign**

   Product designs conform to customer needs (product-based and user-based quality). For example, automobile producers design car seat to conform to the contours of the diver's back.

2. **Quality of Conformance:**

   Product manufactured conforms to product designs (manufacturing-based quality). For example, each car seat produced meets the targeted design specifications.
3. **Quality of Performance:**

   Products manufactured conform to customer needs by performing in the field (user-based quality). For example, the car seats maintain their shape after years of use.

All of these dimensions of quality should be managed through a quality improvement process that enhances customer value. Placing quality in the broader context of customer value counteracts the tendency of people with different functional orientations within an organization t take different views of quality (Garvin, 1988). For example, marketing people tend to have a user-based and product-based view that focuses on matching product characteristics with customer perceptions. Engineers, on the other hand, tend to take a product-based view that focuses on defining product characteristics. Manufacturing people tend to view quality as conformance to specification and targets.

Lesson # 08

TAGUCHI LOSS FUNCTION AND QUALITY MANAGEMENT

Total Quality Paradigms

Adopting a TQ philosophy requires significant changes in organization design, work processes, and culture. Organizations use a variety of approaches. Some emphasize the use of quality tools, such as statistical process control of Six Sigma (which we discuss in the next chapter), but have not made the necessary fundamental changes in their processes and culture. It is easy to focus on tools and techniques but very hard to understand and achieve the necessary changes in human attitudes and behavior. Others have adopted a behavioral focus in which the organization's people are indoctrinated in a customer-focused culture, or emphasize error prevention and design quality, but fail to incorporate continuous improvement efforts. Still other companies focus on problem-solving and continuous improvements, but fail to focus on what is truly important to the customer. Although these firms will realize limited improvements, the full potential of total quality is lost due to a lack of complete understanding by the entire organization.

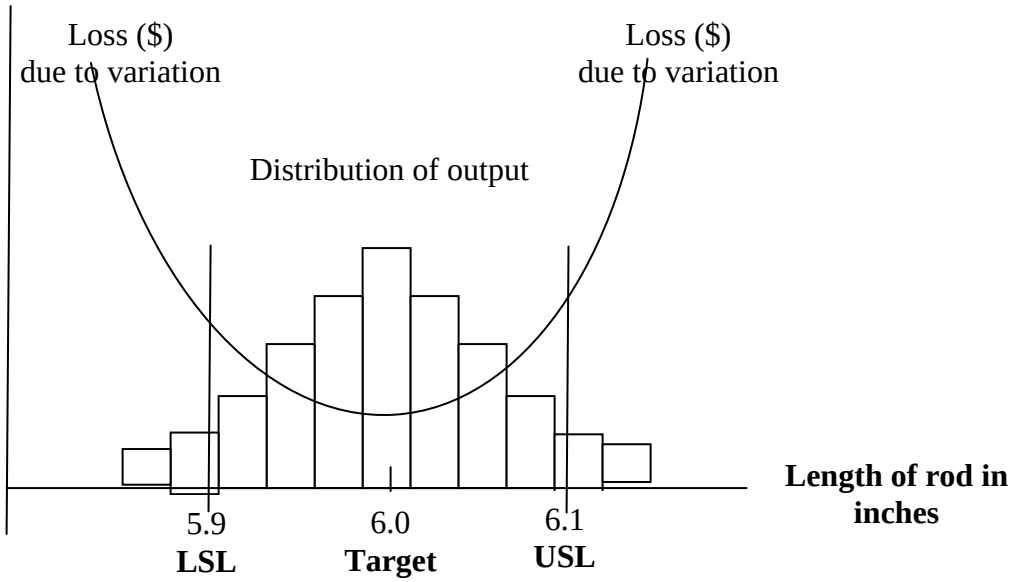
Single approaches, such as statistical tools, behavioral change, or problem solving can have some short-term success, but do not seem to work well over time. Total quality requires a comprehensive effort that encompasses all of these approaches. A total change in thinking, not a new collection of tools, is needed. Total quality requires a set of guiding principles. Such principles have been promoted by the many "quality gurus" – Deming, Juran, and Crosby, Ishikawa and Taguchi. Their insights on measuring, managing, and improving quality have had profound impacts on countless managers and entire corporations around the world.

Defining Quality as Loss Function

Taguchi (1986) suggests that there is increasing loss, for the producer, the customer, and society, associated with increasing variability, or deviation from a target value that reflects the "ideal state." This relationship to variability can be expressed as a loss function, as shown for the distribution of rods from grinding operation C, in Figure 12. The greater the variability, deviation from target, the greater the loss will be.

Traditional specifications, used in the manufacturing-based approach to quality, define conformity n terms of upper and lower specification limits. For example steel rods should meet the engineering specification for length of six inches, plus or minus 10 one-hundredths o an inch (6 + or _ .10). This approach tends to allow complacency concerning variation within that range. It assumes that a product just barely meeting specifications, just within the limit, is just as "good" as on right in the middle, but one just outside the limit is "bad." Taguchi questions these assumptions, and suggests the degree of "badness" or "loss" increases gradually as the deviation from the target value increases. Although managers may choose to do the right thing (the target), in order to provide superior value to customers through superior "quality," they must also continuously improve their systems and reduce variation to meet the target.[20] In the 1980s, Motorola committed to a campaign called Six Sigma, which is one way of saying reduce variation so much that the chance of producing defects is down to about 3.4 defects per million, or 99.99966 percent perfect.

Taguchi's loss function: loss increases as a function of variation



The Deming Management Philosophy

Deming was trained as statistician and worked for Western Electric during its pioneering era of statistical quality control development in the 1920s and 1930s. During World War II he taught quality control courses as part of the national defense effort. Although Deming taught many engineers in the United States, he was not able to reach upper management. After the war, Deming was invited to Japan to teach statistical quality control concepts. Top managers there were eager to learn, and he addressed 21 to executives who collectively resented 80 percent of the county's capital. They embraced Deming's message and transformed their industries. By the mid-1970s, the quality of Japanese products exceeded that of Western manufacturers, and Japanese companies had made significant penetration into Western markets.

Deming taught quality to Japanese and Ishikawa was Deming's student. Americans did not listen to Deming as attentively as Japanese did and took his a prophet of quality.

Lesson # 09

WTO, SHIFTING FOCUS OF CORPORATE CULTURE AND ORGANIZATIONAL MODEL OF MANAGEMENT

WTO (in 20XX)
The Shifting Focus of Corporate Culture

From	To
Thinking Global	Being Global
Focus on Local Market	Focus on Global Market
MNC in manufacturing	MNC in Services
Antagonistic towards Rivals	Collaboration with Rivals
Work with Hands	Work with 3H & H3
Upgrade Technology	Upgrade People
Focus on Process Quality	Focus on Design Quality
Mass Mindset	Lean and Me Mindset
Manage by Control	Manage by Commitment
Individual Values	Shared Values

Organizational Models for Management

Dimension	Mechanistic Model	Organism Model	TQ Model	Cultural Model
Goal	Organizational efficiency and performance	Organizational survival	Long-term survival	Meet individual needs; human development
Definition of quality	Conformance to standards	Customer satisfaction	Satisfying or delighting the customer	Constituent satisfaction
Role/nature of environment	Objective; outside boundary	Objective; inside boundary	Blurred organization and environmental boundaries	Enacted/boundaries defined through relationships
Role of management	Coordinate and provide visible control	Coordinate and provide invisible control by creating vision	Focus on improvement and creating a system that can produce quality outcomes	Coordinate and mediate negotiations
Structural rationality	Chain of command (vertical) Technical rationality	Process flow (horizontal and vertical) Organizational rationality	Horizontal processes beginning with suppliers and ending with customers and supported by teams	Mutual adjustment in any direction Political rationality
Philosophy toward change	Stability is valued; learning arises from specialization	Change and learning assist adaptation	Change, continuous improvement, and learning are encouraged	Change and learning are valued in themselves

Lesson # 10

HISTORY OF QUALITY MANAGEMENT PARADIGMS

The Evolution of Quality Approaches

The shift to Total Quality Management may be revolutionary for many managers because the tenets of the new paradigm are so radically different from past managerial practices. It will require both a thought revolution and a behavioral revolution. Approaches to quality have evolved through a series of gradual refinements over the last century. The shift seems dramatic and revolutionary to many managers because they have not kept up with the evolving approaches over the years. However, they have not defined their managerial roles in terms of the latest advancements or they feel skeptical about its success.

The Four Major Quality Eras

Identifying Characteristics Date of inception	**Inspection (1800s)**	**Statistical Quality Control (1930s)**	**Quality Assurance (1950s)**	**Strategic Total Quality Management (1980s)**
Primary concern	Detection	Control	Coordination	Strategic impact
View of quality	A problem to be solved	A problem to be solved	A problem to be solved, but one that is attacked proactively	A competitive opportunity
Emphasis	Product uniformity	Product uniformity with reduced inspection	The entire production chain, from design to market, and the contribution of all functional groups, especially designers, to preventing quality failures	The market and consumer needs
Methods	Gauging and measurement	Statistical tools and techniques	Programs and systems	Strategic planning, goal-setting, and mobilizing the organization
Role of quality professionals	Inspection, sorting, counting, and grading	Troubleshooting and the application of statistical methods	Quality measurement, quality planning, and program design	Goal-setting, education and training, consultative work with other departments, and program design
Who has responsibility for quality	The inspection department	The manufacturing and engineering departments	All department, although top management is only peripherally involved in designing, planning, and executing quality policies	Everyone in the organization, with top management exercising strong leadership
Orientation and approach	“Inspects in” quality	“Controls in” quality	“Builds in” quality	“Manages in” quality

Customer-Craft OR the Inspection Era

Until the nineteenth century, skilled craftsmen manufactured goods in small volume. They handcrafted and fit together parts to form a unique product that was only informally inspected. Population growth and industrialization brought about production in larger volume. Manufacturing in the industrialized world tended to follow this craftsmanship model till the factory system, with its emphasis on product inspection, started in Great Britain in the mid-1750s and grew into the Industrial Revolution in the early 1800s.

The factory system, a product of the Industrial Revolution in Europe, began to divide the craftsmen's trades into specialized tasks. This forced craftsmen to become factory workers and forced shop owners to become production supervisors, and marked an initial decline in employees' sense of empowerment and autonomy in the workplace.

Quality in the factory system was ensured through the skill of laborers supplemented by audits and/or inspections. Defective products were either reworked or scrapped.

Mass Production and Inspection

In the 1800s, increased specialization, division of labor, and mass production required more formal inspection. Parts had to be interchangeable. Inspectors examined products to detect flaws and separate the good from the bad. They used gauges to catch deviant parts and make sure parts fit together at final assembly. The gauging system made inspections more consistent than those conducted solely by eye, and gave inspection a new respectability.

Formalizing the Inspection Function

By the early 1900s, gauging had become more refined, and inspection was even more important. It was prominent in Henry Ford's moving assembly line and Frederick W. Taylor's system of shop floor management. In 1922, G.S. Radford formally linked inspection to quality control. For the first time, quality was regarded as an independent function and a distinct management responsibility. Radford defined quality in term of conformance to "established requirements" and emphasized inspection. He also suggested some lasting quality principles, such as getting designers involved early, closely coordinating various departments, and achieving the quality improvement results of increased output and lower costs.

Late in the 19th century the United States broke further from European tradition and adopted a new management approach developed by Frederick W. Taylor. Taylor's goal was to increase productivity without increasing the number of skilled craftsmen. He achieved this by assigning factory planning to specialized engineers and by using craftsmen and supervisors, who had been displaced by the growth of factories, as inspectors and managers who executed the engineers' plans.

Taylor's approach led to remarkable rises in productivity, but it had significant drawbacks: Workers were once again stripped of their dwindling power, and the new emphasis on productivity had a negative effect on quality.

To remedy the quality decline, factory managers created inspection departments to keep defective products from reaching customers. If defective product did reach the customer, it was more common for upper managers to ask the inspector, "Why did we let this get out?" than to ask the production manager, "Why did we make it this way to begin with?"

Through the 1920s, however, quality control was most often limited to inspection and focused on activities such as counting, grading, and rework, which is antithetical to Total Quality Management's emphasis on prevention to avoid defects. Inspection departments and quality professionals were not

required to troubleshoot, to understand and address the causes of poor quality, until the 1930s, with the creation of statistical quality control.

In the early 20th century, manufacturers began to include quality processes in quality practices. After the United States entered World War II, quality became a critical component of the war effort: Bullets manufactured in one place, for example, had to work consistently in rifles made in another. The armed forces initially inspected virtually every unit of product; then to simplify and speed up this process without compromising safety, the military began to use sampling techniques for inspection, aided by the publication of military-specification standards and training courses in Walter Shewhart's statistical process control techniques.

The Statistical Quality Control Era

In 1931, Walter A. Shewhart gave quality a scientific footing with the publication of his book Economic Control of Quality of Manufactured Product. Shewhart was one of a group of people at Bell Laboratories investigating problems of quality. The statistical quality control approach that Shewhart advocated is based on his views of quality. Statistical quality control requires that numbers derived from measures of processes or products be analyzed according to a theory of variation that links outcomes to uses.

Shewhart's Views of Quality

Shewhart offered a pragmatic concept of quality: "The measure of quality is a quantity which may take on different numerical values. In other words, the measure of quality, no mater what the definition of quality may be, is a variable". Shewhart's emphasis on measurement in his definition of quality obviously relates to his prescriptions for statistical quality control, which requires numbers.

Shewhart recognized that industrial processes yield data. For example, a process in which metal is cut into sheets yields certain measurements, such as each sheet's length, height and weight. Shewhart determined this data could be analyzed using statistical techniques to see whether a process is stable and in control, or if it is being affected by special causes that should be fixed. In doing so, Shewhart laid the foundation for control charts, a modern-day quality tool.

Shewhart's concepts are referred to as statistical quality control (SQC). They differ from product orientation in that they make quality relevant not only for the finished product but also for the process that created it.

The Quality Assurance Era

During the quality assurance era, the concept of quality in the United States evolved from a narrow, manufacturing-based discipline to one with implications for management throughout a firm. Statistics and manufacturing control remained important, but coordination with other areas, such as design, engineering, planning, and service activities, also became important to quality. While quality remained focused on defect prevention, the quality assurance era brought a more proactive approach and some new tools.

The quality assurance era significantly expanded the involvement of all other functions through total quality control, and inspired managers to pursue perfection actively. However, the approaches to achieving quality remained largely defensive. Controlling quality still meant acting on defects. Quality was something that could hurt a company if ignored, rather than a positive characteristic necessary in obtaining competitive advantage. This view started to change in the 1970s and 1980s, when managers started to recognize the strategic importance of quality.

Total Quality Control and Customer Driven Quality

The beginning of the 20th century marked the inclusion of "processes" in quality practices. A "process" is defined as a group of activities that takes an input, adds value to it and provides an output, such as when a chef transforms a pile of ingredients into a meal.

In 1956, Armand Feigenbaum extended this principle by suggesting that high-quality products are more likely to be produced through total quality control than when manufacturing works in isolation:

> The underlying principle of this total quality view. . . . is that, to provide genuine effectiveness, control must start with the design of the product and end only when the product has been placed in the hands of a customer who remains satisfied .. . . the first principle to recognize is that quality is everybody's job.

The birth of total quality in the United States came as a direct response to the quality revolution in Japan following World War II. The Japanese welcomed the input of Americans Joseph M. Juran and W. Edwards Deming and rather than concentrating on inspection, focused on improving all organizational processes through the people who used them.

Feigenbaum's message reinforced Juran's emphasis on managerial responsibility. To make total quality control work, many companies developed matrices or relationship charts. These charts list functions (departments or groups) across the top and required activities down the side, and shows responsibility relationships in each cell. The considerable overlap among functions means that cross-functional teams are needed to ensure required communication and collaboration, for example, in assessing the "manufacturability" of a design and debugging new manufacturing techniques through pilot runs.

Both Juran and Feignebaum acknowledged that statistical methods and manufacturing control were still important. However, they also felt total quality control would require new management skills to deal with areas such as new product development and vendor selection. Managers also would be required to engage in activities such as quality planning and coordinating cross-functional teamwork. Despite the emphasis on teamwork, Feigenbaum's TQC suggests that more than half of the primary responsibilities for quality belong to the quality control department, another practice that is antithetical to modern Total Quality Management.

W Edwards Deming, a statistician with the U.S. Department of Agriculture and Census Bureau, became a proponent of Shewhart's SQC methods and later became a leader of the quality movement in both Japan and the United States.

The Strategic Quality Management Era

The present quality era, Strategic Quality Management, incorporates elements of each of the preceding eras, particularly the contributions of Shewhart, Deming, Juran, and Feigenbaum. So many elements of previous eras are incorporated into Strategic Quality Management that the last two decades may at first appear to be just a repackaging of old ideas. There are, however, dramatic differences from earlier eras. For the first time, top managers began to view quality positively as a competitive advantage, and to address it in their strategic planning processes, which are focused on customer value.

Because quality started to attract the attention of top managers, it impacted management throughout the organization. Quality was not just for the inspectors or people in the quality assurance department to worry about. This era marks the emergence of a new paradigm for management. A number of developments were brought together and reconfigured into a new approach to management in all departments and specialties.

A variety of external forces brought quality to the attention of top managers. They began to see a link between losses of profitability and poor quality. The forces that brought this connection to their

attention included a rising tide of multimillion-dollar product liability suits for defective products and constant pressures from the government on several fronts, including closer policing of defects, product recalls. Perhaps the most salient external force was the growing market share incursions from foreign competitors, particularly the Japanese, in such diverse industries as semiconductors, automobiles, machine tools, radial tires, and consumer electronics.

Producing products with superior quality, lower cost, and more reliable delivery, Japanese firms gained market shares and achieved immense profitability. The onslaught of these events in the mid-1970s and 1980s seemed rather sudden, However, Japanese firm had been building their industrial capabilities for decades, developing and refining approaches to quality grounded in the principles taught to them by Americans after World War II. Manager and theorists have been captivated by "Japanese management" over the last two decades. Indeed, the Strategic Quality Management era borrows a number of it elements from the developments that quality took place in Japan at the same time as the quality assurance era in the United States.

Total Quality Management

Just as the definition of quality has been a source of confusion, so has the definition of Total Quality Management. There is no consensus on what constitutes TQM. Almost every organization defines it differently or calls it something other than TQM.

In the United States, Total Quality Management is often used to refer to the management approaches being developed in the current era of Strategic Quality Management while the new paradigm is emerging. Ideally, managers in the Strategic Quality Management era regard total Quality management as something more than a "program," and take it beyond all the deficiencies mentioned earlier.

In this context, the word "Total" conveys the idea that all employees, throughout every function and level of an organization, pursue quality. The word "quality" suggests excellence in every aspect of the organization. "Management" refers to the pursuit of quality results through a quality management process. This begins with strategic management processes and extends through product design, manufacturing, marketing, finance, and so on. It encompasses, yet goes beyond, all of the earlier definitions of quality by puling them together into a never-ending process of improvement. Accordingly, TQM is as much about the quality process as it is about quality results or quality products. It began with people, particularly managers.

Lesson # 11

DEFINING QUALITY, QUALITY MANAGEMENT AND LINKS WITH PROFITABILITY

Beyond Total Quality

By the end of the 1990s Total Quality Management (TQM) was considered little more than a fad by many American business leaders (although it still retained its prominence in Europe).

As the 21st century begins, the quality movement has matured. New quality systems have evolved beyond the foundations laid by Deming, Juran and the early Japanese practitioners of quality.

Some examples of this maturation:

- In 2000 the ISO 9000 series of quality management standards was revised to increase emphasis on customer satisfaction.
- Beginning in 1995, the Malcolm Baldrige National Quality Award added a business results criterion to its measures of applicant success.
- Six Sigma, a methodology developed by Motorola to improve its business processes by minimizing defects, evolved into an organizational approach that achieved breakthroughs – and significant bottom-line results.
- Quality Function Deployment was developed by Y. Akao as a process for focusing on customer wants or needs in the design or redesign of a product or service.
- Sector-specific versions of the ISO 9000 series of quality management standards were developed for such industries as automotive (QS-9000), aerospace (AS9000) and telecommunications (TL 9000 and ISO/TS 16949) and for environmental management (ISO 14000) and also for IT Sector
- Quality has moved beyond the manufacturing sector into such areas as service, healthcare, education and government.
- The CMM levels 1-5 emphasize quality in IT sector from the maturity point of view of processes and people.
- Emphasis on learning by doing as a means of continual improvement has been accepted and has paved the way to consider Knowledge as a strategic resource of production in 21st century work place and in work organizations.
- Discussion of Knowledge Management and Learning Organizations are becoming common in all sorts of companies and all sectors of economy and is rather being taken as a source of national competitive advantage in global interconnected and interdependent infocom oriented world.

The Concept of Quality

People define quality in many ways. Some think of quality as superiority or excellence, others view it as a lack of manufacturing or service defects, still others think of quality as related to product features or price. As study that asked managers of 86 firms to define quality produced several dozen different responses, including.

1. perfection
2. consistency
3. eliminating waste
4. speed of delivery
5. compliance with policies and procedures
6. providing a good, usable product
7. doing it right the first time
8. delighting or pleasing customers
9. total customers service and satisfaction[6]

Today most managers agree that the main reason to pursue quality is to satisfy customers. The American National Standards Institute (ANSI) and the American Society for Quality (ASQ) define quality as ""the totality of features and characteristics of a product or service that bears on its ability to satisfy given needs." The view of quality as the satisfaction of customer needs is often called fitness for use. In highly competitive markets, merely satisfying customer needs will not achieve success. To beat the competition, organizations often must exceed customer expectations. Thus, one of the most popular definitions of quality is meeting or exceeding customer expectations.

What is Quality?

To understand total quality, one must first understand quality. Customers that are business organizations will define quality very clearly using specifications, standards, and other measures. This makes the point that quality can be defined and measured. Although few consumers could define quality if asked, all know it when they see it. This makes the critical point that quality is in the eye of the beholder. With the total quality approach, customers ultimately define quality.

People deal with the issue of quality continually in their daily lives. We concern ourselves with quality when grocery shopping, eating in a restaurant, and making a major purchase such as an automobile, a home, a television, or a personal computer. Perceived quality is a major factor by which people make distinctions in the market place. Whether we articulate them openly or keep them in the back of our minds. We all apply a number of criteria when making a purchase. The extent to which a purchase meets these criteria determines its quality in our eyes.

One way to understand quality as a consumer-driven concept is to consider the example of eating at a restaurant. How will you judge the quality of the restaurant? Most people apply such criteria as the following:

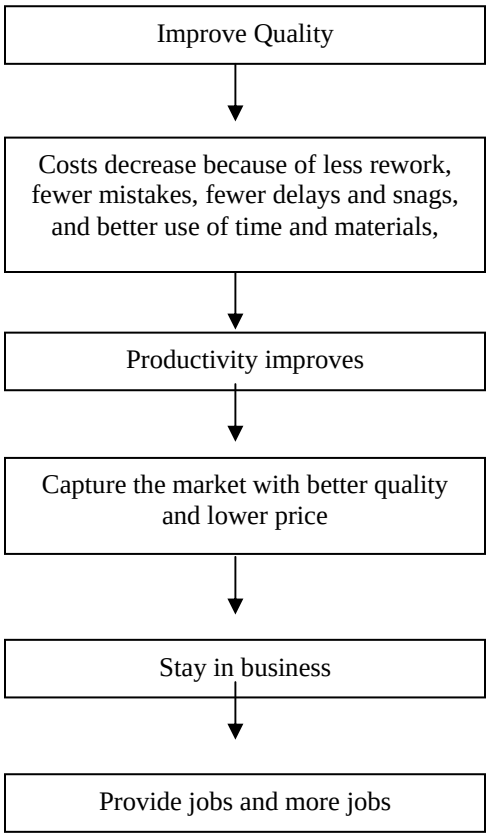
- Service
- Response time
- Food preparation
- Environment/atmosphere
- Price
- Selection

The example gets at one aspect of quality – the results aspect. Does the product or service meet or exceed customer expectations? This is a critical aspect of quality, but it is not the only one. Total quality is a much broader concept that encompasses not just the results aspect but also the quality f people and the quality of processes.

Chain Reaction and Profitability

Deming stresses that higher quality and improvement in quality leads to higher productivity, which in turn leads to long-term competitive strength. The Deming "chain reaction," shown in Figure below, summarizes this view. This theory states that improvements in quality lead to lower cost because of less rework, fewer mistakes, fewer delays and snags, and better use of time and materials. Lower costs, in turn, lead to productivity improvements. With better quality and lower prices, the firm can achieve a higher market share and thus stay in business, providing more and more jobs. Deming states emphatically that top management has the overriding responsibility for quality improvement.

The Deming Chain Reaction



SIPOC Analysis:

A fundamental step in improving a process is to understand how it functions from a process management perspective. This can be seen through the analysis diagram of the process to identify the Supplier-Input-Process-Output-Customer (SIPOC) linkages.

It begins with defining the process of interest and listing the outputs that the process creates that go the customers.

Quality Terminology:

Quality: is fitness for use (Juran)
Quality Control: It is a system where the qualities of products or services are inspected into to produce them economically to meet the requirement of the purchaser. It is the operational technique.
Quality Assurance: It means to assure quality in a product so that a customer can buy it with confidence and use it for a large period of time with satisfaction.
According to ISO, QA means," all those planned and systematic actions necessary to provide adequate confidence that a product or service will satisfy given requirements for quality.
Quality Management system refers to the organization's structure for managing its processes - or activities - that transform inputs of resources into a product or service which meet the organization's objectives, such as satisfying the customer's quality requirements, complying to regulations, or meeting environmental objectives.
Total Quality Management: TQM is both philosophy and a set of guiding principles that represent the foundation of a continuously improving organization. It is the application of quantitative methods as well as human resources to improve the whole supply chain for customers and suppliers.
Customer: Any one who receives or is affected by the product, service, or process.

External Customer: The one outside the company walls or office/department walls or the next one in chain who receives your product, service or idea.
Internal Customers: Staff members, employees or any one who works for the interest of a company or office or boss and expects a reward or salary or benefit from the company or office or boss.
Investor Customer: The one who has invested his fortune and finance to build a company and expects a good return on his/her financial capital or fortune. Shareholders, Stockholders
Social Customer: The society at large.

Lesson # 12

LEARNING ABOUT QUALITY AND APPROACHES FROM QUALITY PHILOSOPHIES

Many individuals have made substantial contributions to the theory and practice of quality management. These include the well-known "gurus": W. Edwards Deming, Joseph M. Juran, and Philip B. Crosby, as well as many other consultants, business executives, and academic researchers. Their philosophical writings and lectures have helped shape management thought as well as provide the foundation for practical management frameworks designed around quality.

Total quality requires a set of guiding principles. Such principles have been promoted by the three "quality gurus" – Deming, Juran, and Crosby. Their insights on measuring, managing, and improving quality have had profound impacts on countless managers and entire corporations around the world. Deming has generated the most interest and controversy. A discussion of his philosophy, which is actually more about management than quality, follows.

The Deming Management Philosophy

Deming was trained as statistician and worked for Western Electric during its pioneering era of statistical quality control development in the 1920s and 1930s. During World War II he taught quality control courses as part of the national defense effort. Although Deming taught many engineers in the United States, he was not able to reach upper management. After the war, Deming was invited to Japan to teach statistical quality control concepts. Top managers there were eager to learn, and he addressed 21 to executives who collectively resented 80 percent of the county's capital. They embraced Deming's message and transformed their industries. By the mid-1970s, the quality of Japanese products exceeded that of Western manufacturers, and Japanese companies had made significant penetration into Western markets.

Deming's contributions were recognized early by the Japanese. The Deming Application Prize was instituted in 1951 by the Union of Japanese Scientists and Engineers in recognition and appreciation for his achievements in statistical quality control. Deming also received the nation's highest honor, the Royal Order of the Sacred Treasure, from the emperor of Japan. The former chairman of NEC Electronics once said, "There is not a day I don't think about what Dr. Deming meant to us."

Deming was virtually unknown in the United States until 1980 where NBC aired a white paper entitled "If Japan Can . . . Why Can't We?" This program made Deming a household name among corporate executives, and companies such as Ford invited him to assist them in revolutionizing their quality approaches. Deming worked with passion until his death in December 1993 at the age of 93, knowing he had little time left to make a difference in his home country. When asked how he would like to be remembered, Deming replied, "I probably won't even by remembered in my home country USA" Then after a long pause, he added, "Well, maybe…. As someone who spent his life trying to keep America from committing suicide."

Unlike other management gurus and consultants, Deming never defined or described quality precisely. In his last book, he stated, "A product or a service possesses quality if it helps somebody and enjoys a good and sustainable market." Deming's philosophy is based on improving products and services by reducing uncertainty and variability in the design and manufacturing processes. In Deming's view, variation is the chief culprit of poor quality. In mechanical assemblies, for example, variations from specifications for part dimensions lead to inconsistent performance and premature wear and failure. Likewise, inconsistencies in service frustrate customers and damage a firm's image. To achieve reduced variation, he advocates a never-ending cycle of product design, manufacture, test, and sales, followed by market surveys, then redesign, and so forth.

Deming has summarized his philosophy in what he calls "A system of Profound Knowledge."

System of Profound Knowledge

Profound knowledge consists of four parts: (1) appreciation for a system, (2) some knowledge of the theory of variation, (3) theory of knowledge, and (4) psychology.

Appreciation for a System

A system is a set of functions or activities within an organization that work together to achieve organizational goals. For example, McDonald's restaurant can be viewed as a system. It consists of the order-taker/cashier subsystem, grill and food preparation subsystem, drive-through subsystem, and so on.

The components of any system must work together for the system to be effective. When parts of a system interact, the system as a while cannot be understood or managed solely in terms of its parts. To run any system, manager must understand the interrelationships among all subsystems and the people that work in them. One example is performance appraisal. The following are some of the factor within a system that affects the individual performance of an employee:

- Training received
- Information and resources provided
- Leadership of supervisors and managers
- Disruptions on the job
- Management policies and practices

According to Deming, however, most performance appraisals do not recognize these factors.

Management must have an aim, a purpose to which the system continually strives. Deming believes that the aim of any system is for everybody – stockholders, employees, customers, community, the environment – to gain over the long term. Stockholders can realize financial benefits, employees can have opportunities for training and education, customers can receive products and services that meet their needs and create satisfaction, the community can benefit from business leadership, and the environment can benefit from socially responsible management.

Deming emphasizes that management's job is to optimize the system. By making decisions that are best for only a small part of the system (often encouraged by competition), we sub-optimize. Sub-optimization results in a loss to everybody in the system. For example, a common practice is to purchase materials or services at the lowest bid. Inexpensive material may be of such inferior quality that they will cause excessive costs in adjustment and repair during manufacture and assembly. Although the purchasing department's track record might look good, the overall system will suffer.
This theory applies to managing people also. Pitting individuals or departments against each other for resources is self-destructive. The individuals or departments will perform to maximize their expected gain, not that of the firm as a whole. Employees must cooperate with each other. Likewise, sales quotas or arbitrary cost reduction goals do not motivate people to improve the system and, ultimately, customer satisfaction; workers will perform only to meet the quotas and goals.

Theory of Variation

The second part of Profound Knowledge some understands of statistical theory, particularly as it applies to variation. Just as no two pizzas or "Qeema Nans" are exactly alike, no two outputs from any production process are exactly alike. A production process contains many sources of variation. Different lots of martial will vary in strength, thickness, or moisture content, for example. Cutting tools will have inherent variation in strength and composition. During manufacturing, tools will experience wear, machine vibrations will cause changes in settings, and electrical fluctuations will cause variations in power. Operators may not position parts on fixtures consistently.

The complex interaction of all these variations in materials, tools, machines, operators, and the environment cannot be understood. Variation due to any individual source appears random; however, their combined effect is stable and can usually be predicted statically. Factors that are present as a natural part of a process are called common causes of variation.

Common causes generally account for about 80 to 90 percent of the observed variation in a production process. The remaining 10 to 20 percent result from special causes of variation, often called assignable causes. Special causes arise from external sources that are not inherent in the process. A bad batch or material purchased from a supplier, poorly trained operator, excessive tools wear, or mis-calibration of measuring instruments are examples of special causes. Special causes result in unnatural variations that disrupt the random pattern of common causes. Hence they are generally easy to detect using statistical methods, and it is usually economical to remove them.

A system governed only by common causes is said to be stable. Understanding a stable system and the differences between special and common causes of variation is essential for managing nay system. Management can make two fundamental mistakes in attempting to improve a process:

1. To treat as special cause any fault, complaint, mistake, breakdown, accident, or shortage when it actually came from common causes.
2. To attribute to common causes any fault, complaint, mistake, breakdown, accident, or shortage when it actually came from a special cause.

In the first case, tampering with a stable system will actually increase the variation in the system. In the second case, we can miss the opportunity to eliminate unwanted variation by assuming that it is not controllable. Changing a system on the basis of a special cause can damage the system and add cost. Variation should be minimized. The producer and consumer both benefit from reduced variation. The producer benefits by having less need for inspection, less scrap and rework, and higher productivity. The consumer is assured that all products have similar quality characteristics; this especially important when the consumer is another firm using large quantities of the product in its own manufacturing or service operation.

Variation increases the cost of doing business. The only way to reduce variation due to common causes is to change the technology of the process -–the machines, people, materials, methods, or measurement system. The process is under the control of management, not the production operators. Pressuring operators to perform at higher quality levels may not be possible and may be counterproductive. Variation due to special causes can be identified through the use of control charts, which shall be introduced latter.

Lesson # 13

TOTAL QUALITY MANAGEMENT THEORIES
EDWARD DEMING'S SYSTEM OF PROFOUND KNOWLEDGE

Theory of Knowledge

The third part of Profound Knowledge is the theory of knowledge – a branch of philosophy and management concerned with the nature and scope of knowledge, its presuppositions and bases, and the general reliability of claims to knowledge.

Deming emphasizes that there is no knowledge without theory and that experience alone does not establish a theory. To copy an example of success without understanding it with the aid of theory may lead to disaster. Experience only describes; it cannot be tested or validated. Theory establishes a cause-and-effect relationship that can be used for prediction. Theory leads to questioning and can be tested and validated – it explains why. Many consultant methods that have sustained success are grounded in theory. Managers have responsibility to learn and apply theory.

Psychology

Psychology helps us to understand people, interactions between people and circumstances, interactions between leaders and employees, and any system of management. People differ from one another. A leader must be aware of these differences and use them to optimize everybody's abilities and inclinations.

Many managers operate under the supposition that all people are alike and treat them as interchangeable components of a process. However, people learn in different ways and at different speeds and perform at different levels. Leaders have an obligation to make changes in the system of management that will bring improvement. People have an innate need for relationships with other people and for self-esteem and respect. Circumstances provide some people with dignity and self-esteem and deny them to other people. People inherit the right to enjoy work. Psychology helps us to nurture and preserve people's positive innate attributes.

Perspectives on Profound Knowledge

Little in Deming's system of Profound Knowledge is original. The concept of common and special causes of variation was developed by Walter Shewhart in the 1920s; behavioral theories to which Deming subscribes were developed in the 1960s; systems theory was refined by management scientists from the 1950s through the 1970s; and scientists in all fields have long understood the relationships among prediction, observation, and theory. Deming's contribution was in tying together some basic concepts. He recognized the synergy among these diverse subjects and developed them into a theory of management.

Peter Scholtes, a noted consultant, makes some salient observations about the failure to understand the components of Profound Knowledge:

1. **When people don't understand systems;**
   - They see events as individuals incidents rather than the net result of many interactions and interdependent forces;
   - They see the symptoms but not the deep causes of problems;
   - They don't understand how an intervention in one part of [an organizational] can cause havoc in another place or at another time;
   - They blame individuals for problems even when those individuals have little or no ability to control the events around them; and

2. When people don't understand variation;

- They don't see trends that are occurring;
- They see trends where there are none;
- They don't know when expectations are realistic;
- They don't understand past performance so they can't predict future performance;
- They don't know the difference between prediction, forecasting, and guesswork;
- They give others credit or blame when those people are simply either lucky or unlucky. This usually occurs because people tend to attribute everything to human effort, heroics, frailty, error, or deliberate sabotage, no matter what the systemic cause; and
- They are less likely to distinguish between fact and opinion.

3. When people don't understand psychology;

- They don't understand motivation or why people do what they do;
- They resort to carrots and sticks and other forms of induced motivation that have no positive effect and impair the relationship between the motivator and the one being motivated;
- They don't understand the process of change and the resistance to it;
- The revert to coercive and paternalistic approaches when dealing with people; and
- They create cynicism, demoralization, de-motivation, guilt, resentment, burnout, craziness, and turnover.

4. When people don't understand the theory of knowledge;

- They don't know how to plan and accomplish learning and improvement;
- They don't understand the difference between improvement and change; and
- Problems will remain unsolved, despite their best efforts.

Deming's Philosophy & 14 Points for Management

The 14 Points for Management, listed below in table have been the subject of considerable controversy and debate. They have their basis in System of Profound Knowledge. Many companies have studied and applied them to their organizations with success.

1. Create and publish to all employees a statement of the aims and purposes of the company of other organization. The management must demonstrate constantly their commitment to this statement.
2. Learn the new philosophy, top management and everybody.
3. Understand the purpose of inspection, for improvement of processes and reduction of cost.
4. End the practice of awarding business on the basis of price tag alone.
5. Improve constantly and forever the system of production and service.
6. Institute training.
7. Teach and instituted leadership
8. Drive out fear. Create trust. Create a climate for innovation.
9. Optimize toward the aims and purposes of the company the efforts of teams, groups, staff areas.
10. Eliminate exhortations for the workforce.
11. (a) Eliminate numerical quotas for production. Instead, learn and institute methods for improvement.
    (b) Eliminate MBO (Management by Objective). Instead, learn the capabilities of processes and how to improve them.
12. Remove barriers that rob people of pride of workmanship.
13. Encourage education and self-improvement for everyone.
14. Take action to accomplish the transformation.

Detail Explanation of Deming's Fourteen Points of TQM

1. **Management Commitment** – Businesses should not exist simply for profit; their true purpose should be to serve their customers and employees. To do this, they must take a long-term view and invest in innovation, training, and research. Thus, an organization needs a clear mission and statement of purpose.
2. **Learn the New Philosophy** – Western management has been built on the Taylor system, which has led to numbers-driven production, quotas, and adversarial work relationships. Old methods of management create mistrust, fear, and anxiety with a focus on "Satisfying" rather than on "optimizing." Eliminating defects is not good enough. Defect-free production is taken for granted in Japan. Achieving competitive success in today's global economy requires a customer-driven approach based on mutual cooperation between labor and management and a never-ending cycle of improvement. Everyone, from the boardroom to the stockroom, must learn the new philosophy.

3. **Understand Inspection** – Routine inspection acknowledges defects but does not add value to the product. Instead, it encourages defects because "someone else" catches and fixes the problems. This procedure increases costs and decreases productivity. Workers must take responsibility for their own work and be able to take appropriate action to assure good quality. Manager need to understand how variation affects their processes and to take steps to reduce the causes of variation. Inspection should be used as information-gathering tools for improvement, not as an end in itself.

Lesson # 14

DEMING'S PHILOSOPHY AND 14 POINTS FOR MANAGEMENT

4. **End Price Tag Decisions** – Purchasing decisions traditionally have been driven by cost through competitive bidding, not by quality. Costs due to inferior materials and components increase costs in later stages of production and can far exceed the "savings" realized through competitive bidding. The purchasing department is a supplier to the production department and must understand its new role. Suppliers themselves are part of the whole system.

5. **Improve constantly** – Western management has typically thought of improvement in the context of large, expensive innovations such as robotics and computer-integrated manufacturing. The success of Japanese manufacturers, however, is due primarily to continuous, small, incremental improvements in design and production. Improved design results from understanding customer needs and from continual market surveys and other sources of feedback. Improved production is achieved by reducing the causes of variation in order to establish a stable, predictable production process. Statistical methods provide one means for doing this. Improvement should go beyond production, encompassing transportation, engineering, maintenance, sales, service, and administration – all areas of the organization.

6. **Institute Training** – Employees need the proper tools and knowledge to do a good job, and it is management's responsibility to provide these. In addition to specific job skill, all employees should be trained in statistical tools for quality problem solving and continuous improvement. Training not only improves quality and productivity, but also enhances workers' morale by showing them that the company is dedicated to helping them and is investing in their future. Deming notes that in Japan, entry-level managers spend 4 to 12 years on the factory floor and in other activities to learn the problems of production. At Honda f America in Maryville, Ohio, all employees start out on the production floor regardless of their job classification.

7. **Institute Leadership** – The job of management is leadership and guidance, not supervision and work direction. Supervisors should be coaches, not policemen, and supervision should provide the link between management and the workforce. Leadership can help to eliminate fear and encourage teamwork.

8. **Drive out Fear** – Fear in work manifests in many ways: fear of reprisal, fear of failure, fear of the unknown, fear of change. Many workers fear punishment or reprisals for not meeting quotas and for problems of the system that are beyond their control. Managers compete against each other to protect their own jobs or to receive higher performance ratings. Fear encourages short0term, selfish thinking, not long-term improvement for the benefit of all.

9. **Optimize Team Efforts** – Barriers between individuals and departments lead to poor quality, because "customers" do not receive what they need from their "suppliers." This is often the result of internal competition for raises or performance ratings. Teamwork helps to break down barriers between internal customers and suppliers. The focus should be on meeting customer needs and improving processes. Teamwork is an important means of achieving a company's goals.

10. **Eliminate Exhortations** – Motivation can be better achieved through trust and leadership than slogans. Slogans calling for improved quality usually assume that poor quality results from a lack of motivation. Workers cannot improve solely through motivational methods when the system in which they work constrains their performance. On the contrary, they will become frustrated and their performance will decrease further.

11. **Eliminate Quotas and MBO** – Numerical quotas reflect short-term perspectives and do not encourage long-term improvement, particularly if rewards or performance appraisals are tied to meeting quotas. Workers may shortcut quality to reach the goal. If the quota is met, they have

no incentive to continue production or to improve quality. Arbitrary management goals without a method for achieving them have no meaning. Further, variation in the system makes year-to-year or quarter-to-quarter comparisons meaningless. The typical American MBO system focuses on results, not process, and encourages short-term behavior. Management must understand the system and the variation within it and seek to improve it in the long term.

12. **Remove Barriers to Pride in Workmanship** – The Taylor system has promulgated the view of workers as a "commodity." Factory workers are given monotonous tasks, provided with inferior machines, tools, or materials, told to run defective items to meet sales pressures, and report to supervisors who know nothing about the job.

    Deming believed that one of the biggest barriers to pride in workmanship is performance appraisal. Performance appraisals

    - Destroy teamwork by promoting competition among employees for limited resources;
    - Foster mediocrity since objectives typically are driven by numbers and what the boss wants;
    - Focus on short-term results and discourage risk taking; and
    - Are not focused on serving the customer.

    Deming suggest that there are three categories of performance: the majority who work within the system, those outside the system on the superior side, and those outside they system on the inferior side. Statistical methods provide the means of making this classification. Superior performers should be compensated specially; inferior performers need extra training or a different job.

13. **Institute Education** – "Training" in number 6 refers to job skills; education refers to self-development. Firms have a responsibility to develop the value and self-worth of the individual. Investing in people is a powerful motivation method.

14 **Take Action** – The TQM philosophy is a major cultural change and many firms find it difficult. Top management must institute the process and include everyone in it.

T Continuous improvement is an ongoing effort to improve products, services or processes. These efforts can seek "incremental" improvement over time or "breakthrough" improvement all at once.

Among the most widely used tools for continuous improvement is a four-step quality model—the plan-do-check-act (PDCA) cycle, also known as Deming Cycle or Shewhart Cycle:

- **Plan:** Identify an opportunity and plan for change.
- **Do:** Implement the change on a small scale.
- **Check:** Use data to analyze the results of the change and determine whether it made a difference.
- **Act:** If the change was successful, implement it on a wider scale and continuously assess your results. If the change did not work, begin the cycle again.

Other widely used methods of continuous improvement — such as Six Sigma, Lean, and Total Quality Management — emphasize employee involvement and teamwork; measuring and systematizing processes; and reducing variation, defects and cycle times.

***Continuous* or *Continual*?**

The terms *continuous improvement* and *continual improvement* are frequently used interchangeably. But some quality practitioners make the following distinction:

- *Continual improvement:* a broader term preferred by W. Edwards Deming to refer to general processes of improvement and encompassing "discontinuous" improvements—that is, many different approaches, covering different areas.
- *Continuous improvement*: a subset of continual improvement, with a more specific focus on linear, incremental improvement within an existing process. Some practitioners also associate *continuous improvement* more closely with techniques of statistical process control.

The cost of quality

It's a term that's widely used – and widely misunderstood.
The "cost of quality" isn't the price of creating a quality product or service. It's the cost of NOT creating a quality product or service.

Every time work is redone, the cost of quality increases. Obvious examples include:

- The reworking of a manufactured item.
- The retesting of an assembly.
- The rebuilding of a tool.
- The correction of a bank statement.
- The reworking of a service, such as the reprocessing of a loan operation or the replacement of a food order in a restaurant.

In short, any cost that would not have been expended if quality were perfect contributes to the cost of quality.

Total Quality Costs

As the figure below shows, quality costs are the total of the cost incurred by:

- Investing in the prevention of nonconformance to requirements.
- Appraising a product or service for conformance to requirements.
- Failing to meet requirements.

Quality Costs—general description

Prevention Costs

The costs of all activities specifically designed to prevent poor quality in products or services.

Examples are the costs of:

- New product review
- Quality planning
- Supplier capability surveys
- Process capability evaluations
- Quality improvement team meetings
- Quality improvement projects
- Quality education and training

Appraisal Costs

The costs associated with measuring, evaluating or auditing products or services to assure conformance to quality standards and performance requirements.

These include the costs of:

- Incoming and source inspection/test of purchased material
- In-process and final inspection/test
- Product, process or service audits
- Calibration of measuring and test equipment
- Associated supplies and materials

Failure Costs

The costs resulting from products or services not conforming to requirements or customer/user needs. Failure costs are divided into internal and external failure categories.

Internal Failure Costs

Failure costs occurring prior to delivery or shipment of the product, or the furnishing of a service, to the customer.

Examples are the costs of:

- Scrap
- Rework
- Re-inspection
- Re-testing
- Material review
- Downgrading

External Failure Costs

Failure costs occurring after delivery or shipment of the product -- and during or after furnishing of a service -- to the customer.

Examples are the costs of:

- Processing customer complaints
- Customer returns
- Warranty claims
- Product recalls

Total Quality Costs:

The sum of the above costs. This represents the difference between the actual cost of a product or service and what the reduced cost would be if there were no possibility of substandard service, failure of products or defects in their manufacture.

Lesson # 15

DEMING CYCLE AND QUALITY TRILOGY

Deming Cycle

Deming cycle is a tool for continuous improvement and it is a tool for an ongoing effort to improve products, services or processes. These efforts can seek "incremental" improvement over time or "breakthrough" improvement all at once.

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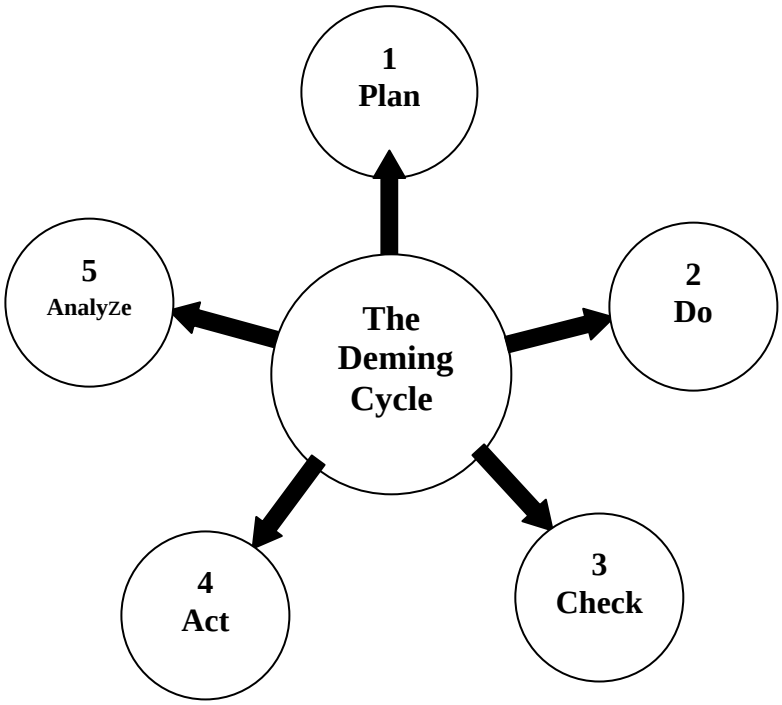
- **Act:** If the change was successful, implement it on a wider scale and continuously assess your results. If the change did not work, begin the cycle again.

Deming cycle was developed to link the production of a product with consumer needs and focus the resources of all departments (research, design, production, and marketing) in a cooperative effort to meet those needs. The Deming Cycle proceeds as follows:

1. Conduct consumer research and use it in planning the product (PLAN).
2. Produce the product (DO).
3. Check the product to make sure it was produced in accordance with the plan (CHECK).
4. Market the product (ACT).
5. Analyze how the product is received in the marketplace in terms of quality, cost, and other criteria (ANALYZE).



DEMING CYCLE

Other widely used methods of continuous improvement — such as Six Sigma, Lean Production, and Kaizen — emphasize employee involvement and teamwork; measuring and systematizing processes; and reducing variation, defects and cycle times.

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Juran's Contribution

Joseph M. Juran ranks near Deming in the contributions he has made to quality and the recognition he has received as a result. His Juran Institute. Inc., in Connecticut, USA is an international leader in conducting training, research, and consulting activities in the area of quality management. Quality materials produced by Juran have been translated into 14 different languages.

Juran holds degrees in both engineering and law. The emperor of Japan awarded him the Order of the Sacred Treasure medal, in recognition of his efforts to develop quality in Japan and to promote friendship between Japan and the United States. Juran is best known for the following contributions to the quality philosophy:

- Juran's Three Basic Steps to Progress
- Juran's Ten Steps to Quality Improvement
- The Juran Trilogy

Juran's Three Basic Steps to Progress

Juran's Three Basic Steps to Progress are broad steps that, in Juran's opinion, companies must take if they are to achieve world-class quality. He also believes there is a point of diminishing return that applies to quality and competitiveness. An example illustrates his observation:

> Say that an automobile maker's research on its cars reveals that buyers drive them an average of 50,000 kms before trading them in. Applying Juran's theory, this automaker should invest the resources necessary to make this line of cars run trouble free for perhaps 60,000 kms. According to Juran, resources devoted to improving quality beyond this point will run the cost up higher than the typical buyer is willing to pay.

I. Achieve structured improvements on a continual basis combined with dedication and a sense of urgency.
II. Establish an extensive training program.
III. Establish commitment and leadership on the part of higher management

Juran's Ten Steps to Quality Improvement

Examining Juran's Ten Steps to Quality Improvement, you will see some overlap between them and Deming's Fourteen Points. They also mesh well with the philosophy of other quality experts.

1. Build awareness of both the need for improvement and opportunities for improvement.
2. Set goals for improvement.
3. Organize to meet the goals that have been set.
4. Provide training.
5. Implement projects aimed at solving problems.
6. Report progress.
7. Give recognition.
8. Communicate results.
9. Keep score.
10. Maintain momentum by building improvement into the company's regular systems.

The Juran Trilogy

The Juran Trilogy summarizes the three primary managerial functions.

Quality Planning, Quality Control, and Quality Improvement

Lesson # 16

JURAN AND CROSBY ON QUALITY AND QUALITY IS FREE

The Juran Philosophy and Trilogy

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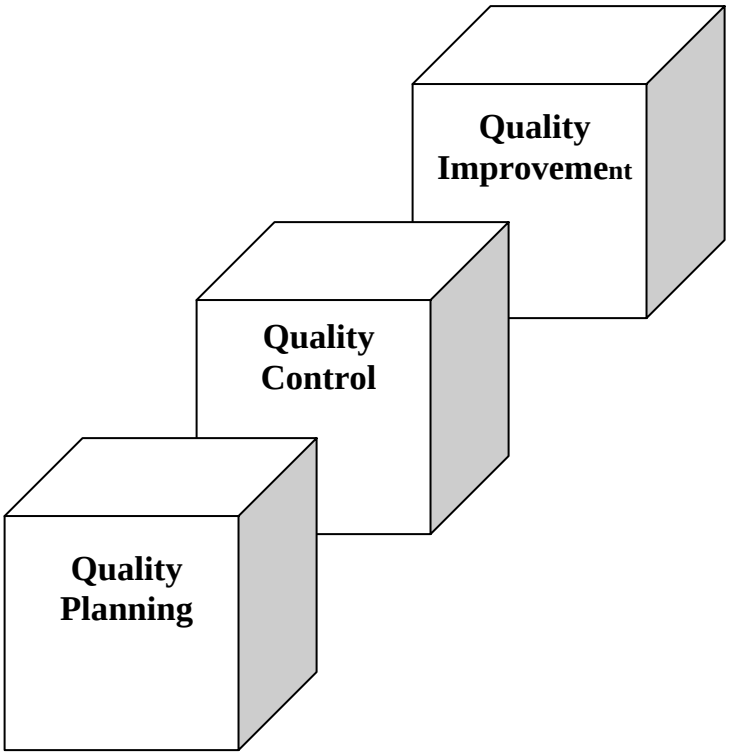


Juran taught quality principles to the Japanese in the 1950s just after Deming and was a principal force in their quality reorganization. Like Deming, he concludes that we face a major crisis due to the loss of sales to foreign competition and the huge costs of poor quality. To solve this crisis, new thinking about quality that includes all levels of the managerial hierarchy is required. Upper management in particular requires training and experience in managing for quality.

Juran's programs are designed to fit into a company's current strategic business planning with minimal risk of rejection. This is in contrast to Deming who proposes sweeping cultural change. Juran contends that employees at different levels of an organization speak in different "languages." (Deming believes statistics should be the common language.)

Top management speaks in the language of dollars, workers speak in the language of things, and middle management must be able to speak both languages and translate between dollars and things. Thus, to get top management's attention, quality issues must be cast in the language they understand – dollars.

Juran advocates the accounting and analysis of quality costs to focus attention on quality problems. At the operational level, Juran's focus is on increasing conformance to specifications through elimination of defects, supported extensively by statistical tools for analysis. Thus, his philosophy fits well into existing management systems.

Juran defines quality as "fitness for use." (Deming advocates no specific definition.) This s broken down into four categories: quality of design, quality of conformance, availability, and field service. Quality of design focuses on market research, the product concept, and design specifications. Quality of conformance includes technology, manpower, and management Availability focuses on reliability,

maintainability, and logistical support. Field service quality comprises promptness, competence, and integrity.

Juran views the pursuit of quality on two levels: (1) the mission of the firm as whole is to achieve high product quality, and (2) the mission of each individual department in the firm is to achieve high production quality. Like Deming, Juran advocates a never-ending spiral of activities that includes market research, product development, design, planning for manufacture, purchasing, production process control, and inspection and testing, followed by customer feedback. Because of the interdependence of these functions, the need for competent company-wide quality management is great. Senior management must play an active and enthusiastic leadership role in the quality management process.

Juran's prescriptions focus on three major aspects of quality called the Quality Trilogy.

Quality planning – the process for preparing to met quality goals,
Quality control – the process for meeting quality goals during operations, and
Quality improvement – the process for breaking through to unprecedented levels of performance.

Quality planning begins with identifying customers, both external and internal, determining their needs, and developing product features that respond to customer needs.

Quality control involves determining what to control, establishing units of measurement so that data may be objectively evaluated, establishing standards of performance, measuring actual performance, interpreting the difference between actual performance and the standard, and taking action on the difference.

Juran's program for quality improvement involves demonstrating the need for improvement, identifying specific projects for improvement, organizing to guide the projects, diagnosing the causes, providing remedies for the causes, proving that the remedies are effective under operating conditions, and providing control to hold improvements.

Quality Planning: Quality planning involves developing the products, systems, and process needed to meet or exceed customer expectations. The following steps are required:

1. Determine who the customers are.
2. Identify customers' needs.
3. Develop products with features that respond to customer needs.
4. Develop systems and processes that allow the organization to produce these features.
5. Deploy the plans to operational levels.

Quality Control: The control of quality involves the following processes:

1. Assess actual quality performance.
2. Compare performance with goals.
3. Act on differences between performance and goals.

Quality Improvement: The improvement of quality should be ongoing continual:

1. Develop the infrastructure necessary to make annual quality improvements.
2. Identify specific areas in need of improvement, and implement improvement projects.
3. Establish a project team with responsibility for completing each improvement project.
4. Provide teams with what they need to be able to diagnose problems to determine root causes develop solutions, and establish control that will maintain gains made.

Juran's assessment of most companies is that quality control is far and away the top priority among the trilogy and most companies feel they are strong in this category. Quality planning and quality improvement, however, are not important priorities and are significantly weaker in most organizations. He feels that more effort needs to be placed on quality planning and even more on quality improvement.

Japanese efforts at quality improvement were supported by massive training programs and top management leadership. Training in managerial quality-oriented concepts as well as training in the tools for quality improvement, cost reduction, data collection, and analysis is one of the most important components of Juran's philosophy. Juran maintains that the Japanese experience leaves little doubt as to the significance of the return on quality training in competitive advantage, reduced failure costs, higher productivity, smaller inventories, and better delivery performance.

Crosby's Philosophy and Contributions

Philip B. Crosby started his career in quality later than Deming and Juran. His corporate background includes 14 years as director of quality at ITT (1965-1979). He left ITT in 1979 to form Philip Crosby Associates, an international consulting firm on quality improvement, which he ran until 1992, when he retired as CEO to devote his time to lecturing on quality related issues.

Crosby, who defines quality simply as conformance to customer requirements, is best known for his advocacy of zero defects management and prevention as opposed to statistically acceptable levels of quality. He is also known for his work on Costs of Quality, Quality is Free and Crosby's Fourteen Steps to Quality Improvement.

The essence of Crosby's quality philosophy is embodied in what he calls the Absolutes of Quality Management and the Basic Elements of Improvement..
Crosby's Absolutes of Quality Management are as follows:

- ***Quality means conformance to requirements not elegance.*** Crosby dispels the myth that quality is simply a feeling of "excellence." Requirements must be clearly stated so that they cannot be misunderstood. Requirements are communication devices and are ironclad. Once a task is done, one can take measurements to determine conformance to requirements. The nonconformance detected is the absence of quality. Quality problems become nonconformance problems – that is, variation in output. Setting requirements is the responsibility of management.

- ***There is no such thing as a quality problem.*** Problems must be identified by the individuals or departments that cause them. There are accounting problems, manufacturing problems, design problems, front-desk problems, and so on. Quality originates in functional departments, not in the quality department, and the burden of responsibility for such problems lies with the functional departments. The quality department should measure conformance, report results, and lead the drive to develop a positive attitude toward quality improvement. This is similar to number 3 of Deming's Points.
- ***There is no such thing as the economics of quality:*** *it is always cheaper to do the job right the first time.* Crosby supports the premise that "economics of quality" has no meaning. Quality is free. What costs money are all the actions that involve not doing jobs right the first time. The Deming Chain Reaction provides a similar message.

Lesson # 17

CROSBY'S CONCEPT OF COST OF QUALITY

- ***The only performance measurement is the cost of quality***. The cost of quality is the expense of nonconformance. Crosby notes that most companies spend 15 to 20 percent of their sales dollars on quality costs. Accompany with a well-run quality management program can achieve a cost of quality that is less than 2.5 percent of sales, primarily in the prevention and appraisal categories. Crosby's program calls for measuring and publicizing the cost of poor quality. Quality cost data are useful in calling problems to management's attention, selecting opportunities for corrective action, and tracking quality improvement over time. Such data provide visible proof of improvement and recognition of achievement. Juran also supports this theme.

- ***The only performance standard is Zero Defects***. Crosby feels that the Zero Defects (ZD) concept is widely misunderstood and resisted. Zero Defects is not a motivational program. It is as follows:

> Zero Defects is a performance standard. It is the standard of the craftsperson regardless of his or her assignment. The theme of ZD is doing it right the first time. That means concentrating on preventing defects rather than just finding and fixing them.
>
> People are conditioned to believe that error is inevitable; thus they not only accept error, they anticipate it. It does not bother us to make a few errors in our work. . . . To err is human. We all have our own standards in business or academic life-our own points at which errors begin to bother us. It is good to get an A in school, but it may be OK to pass a course with a C.
>
> We do not maintain these standards, however, when it comes to our personal life. If we did, we should expect to be shortchanged every now and then when we cash our paycheck; we should expect hospital nurses to drop a constant percentage of newborn babies. . . . We as individuals do not tolerate these things. We have a dual standard: one for ourselves and one for our work.

Most human error is caused by lack of attention rather than lack of knowledge. Lack of attention is created when we assume that error is inevitable. If we consider this condition carefully and pledge ourselves to make a constant conscious effort to do our jobs right the first time, we will take a giant step toward eliminating the waste of rework, scrap, and repair that increases cost and reduces individual opportunity.

Crosby summarized his approach to management in what he refers to as the Absolutes of Quality Management, which answer the following questions.

1. What is quality?
2. What system is needed to cause quality?
3. What performance standard should be used?
4. What measurement system is required?

Answers

1. The First Absolute: The Definition of Quality is conformance to Requirements.
2. The Second Absolute: The System of Quality Is Prevention.
3. The Third Absolute: the Performance Standard Is Zero Defects.
4. The Fourth Absolute: The Measurement of Quality Is the Price of Nonconformance.

Cost of Quality

Until the 1950s, manager assumed it was important to improve quality because defects were costly. But they had no idea just how costly defects were and consequently did not know how much they should

improve. They had no yardstick for measuring the costs of quality. In addition to emphasizing management's role in quality, Joseph Juran and Philip Crosby gave managers a means of answering a critical question which remained in their minds: "How much quality is enough?

The cost of achieving a given level of quality is divided into avoidable costs and unavoidable costs. Unavoidable costs are those related to preventing defects. These include inspection, sampling, sorting, and other quality control initiatives.

Avoidable costs are related to defects and product failures. These include scrapped materials, labor hours required for rework and repair, complaint processing, and financial losses resulting from unhappy customers. Juran and Crosby called avoidable costs "gold in the mine" because investment in quality improvement can sharply reduce them and lead to substantial savings. With Juran and Crosby's cost of quality concept, manager could calculate when additional expenditures on prevention were justified.

Unlike Juran and Deming, Crosby's program is primarily behavioral. He places more emphasis on management and organizational processes for changing corporate culture and attitudes than on the use of statistical techniques. Like Juran and unlike Deming, his approach fits well within existing organizational structures.

Cost of Quality Attitude:

In fact in daily life we pay the price for our not so good attitude in rupees, or in the form of lost respect or rapport or even anger and frustration which are the emotional costs. How to plan to prevent them is every body's responsibility. Best price or zero cost is the prerogative cost. It is the compliment or comment given to you by your customer, by your family or by they boss when he or she ask that has he or she paid you enough for your quality work and are you really happy with him on the given reward!

Quality Management Characteristics for the Future

To succeed in the global marketplace for now and in the future, organizations will have to operate according to the principles of quality management. Such companies will have the following characteristics:

- A total commitment to continually increasing value for customers, investors, and employees.
- A firm understanding that market driven means that quality is defined by customers, not the company
- A commitment to leading people with a bias for continuous improvement and communication.
- A recognition that sustained growth requires the simultaneous achievement of four objectives all the time, forever: (a) customer satisfaction, (b) cost leadership, (c) effective human resources, and (d) integration with the supplier base.
- A commitment to fundamental improvement through knowledge, skills, problem solving, and teamwork.

Companies that develop these characteristics will be those that fully institutionalize the principles of quality management. Consequently, quality management as both a practice and a profession has a bright future. In fact, in terms of succeeding in the global marketplace, quality management is the future. Consequently, more and more companies are making quality management the way they do business, and more and more institutions of higher education are offering quality management courses and programs.

Lesson # 18

COSTS OF QUALITY AND RETURN ON QUALITY

The Cost of Quality:

It's a term that's widely used – and widely misunderstood.The "cost of quality" isn't the price of creating a quality product or service. It's the cost of NOT creating a quality product or service.Every time work is redone, the cost of quality increases. Obvious examples include:

- The reworking of a manufactured item.
- The retesting of an assembly.
- The rebuilding of a tool.
- The correction of a bank statement.
- The reworking of a service, such as the reprocessing of a loan operation or the replacement of a food order in a restaurant.

In short, any cost that would not have been expended if quality were perfect contributes to the cost of quality.

Total Quality Costs

As the table below shows, quality costs are the total of the cost incurred by:

- Investing in the prevention of nonconformance to requirements.
- Appraising a product or service for conformance to requirements.
- Failing to meet requirements.

Quality Costs—general description

Prevention Costs
The costs of all activities specifically designed to prevent poor quality in products or services.
Examples are the costs of:

- New product review
- Quality planning
- Supplier capability surveys
- Process capability evaluations
- Quality improvement team meetings
- Quality improvement projects
- Quality education and training

Appraisal Costs
The costs associated with measuring, evaluating or auditing products or services to assure conformance to quality standards and performance requirements.
These include the costs of:

- Incoming and source inspection/test of purchased material
- In-process and final inspection/test
- Product, process or service audits
- Calibration of measuring and test equipment
- Associated supplies and materials

Failure Costs
The costs resulting from products or services not conforming to requirements or customer/user needs. Failure costs are divided into internal and external failure categories.
Internal Failure Costs
Failure costs occurring prior to delivery or shipment of the product, or the furnishing of a service, to the customer.
Examples are the costs of:

- Scrap
- Rework
- Re-inspection
- Re-testing
- Material review
- Downgrading

External Failure Costs
Failure costs occurring after delivery or shipment of the product -- and during or after furnishing of a service -- to the customer.
Examples are the costs of:

- Processing customer complaints
- Customer returns
- Warranty claims
- Product recalls

Total Non Quality Costs and Return on Quality:

The sum of the above costs to produce a product or to deliver a service. This represents the difference between the actual cost of a product or service and what the reduced cost would be if there were no possibility of substandard service, failure of products or defects in their manufacture. The measure of revenue saved by producing the right product the first time and every time will actually be the return one gets by implementing the system of quality.

In general if preventive system costs Rs. 1 like any QA system then QC overheads are RS 10 in comparison. The costs incurred on failure is Rs 100 and even sometime higher (1000 or more) as you may totally loose your customers, your rapport or your total market.

Hence we need to learn that quality system is an investment which ultimately reduces the total cost of production or working as we have to consider every effort of ours financially accountable to make quality a business case.

Quality is a continuous journey and hence not a destination.

Lesson # 19

OVERVIEW OF TOTAL QUALITY APPROACHES

"A company that claims that it cannot standardize and must rely on experience is a company without technology."
Kaoru Ishikawa

The Total View of Quality

The concept of customer value represents a dramatic improvement over the traditional approach to quality, the "conformance to specified standards" approach. It extends the concept of quality to include user perceptions and use consequences. However, it still falls short of the concept of Total Quality, which stresses the importance of quality in every aspect of an organization.

Perhaps the Japanese best express this broader and more holistic view of quality, Ishikawa states: "Narrowly interpreted, quality means quality of product. Broadly interpreted, quality means quality of work, quality of service, quality of information, quality of process, quality of division, quality of people including workers, engineers, managers, and executives, quality of system, quality of company, quality of objective, etc.'" This view of quality may at first seem to be too idealistic. However, managers who are committed to this view of quality have pragmatic solutions for translating the word "quality" into organizational realities.

As Imai suggests, it all begins with the "quality of people." He states:

> There is very little agreement on what constitutes quality. In its broadest sense, quality is anything that can be improved. When speaking of "quality" one tends to think first in terms of product quality. When discussed in the context of kaizen strategy nothing could be further off the mark. The foremost concern here is with the quality of people. The three building blocks of a business are hardware, software, and "human ware." Only after human ware is squarely in place should the hardware and software aspects of a business be considered. Building quality into people means helping them become kaizen conscious.

This total view of quality includes all of the above quality themes we have already seen, integrating them into a comprehensive approach to continuous improvement.

The Future of Quality Management

In an article for Quality Digest, another quality pioneer Armand Feigenbaum explains several trends that will shape the future of quality management. Those trends are as follows:

- **Demanding global customers.** The provision of quality begets an ever-increasing demand for quality. Today's customers share two common characteristics: (a) they are part of regional trade alliances such as the Americas, Europe, and Asia: and (b) they expect both high quality and added value.

- **Shifting customer expectations.** Increasingly, today's global customer is interested not just in the quality of a product provided but also the quality of the organization that backs it up. Customers want an excellent product or service from an organization that also provides accurate billing, reliable delivery, and after-purchase support.

- **Opposing economic pressures.** The global marketplace exerts enormous, unrelenting pressure on organizations to continually improve quality while simultaneously reducing the prices they charge for goods and services. The key to achieving higher quality and lower prices for

customers is the reduction of the expenses associated with satisfying unhappy customers – expenses that amount to as much as 25% of the cost of sales in many companies.

- **New approaches to management.** Companies that succeed in the global marketplace have learned that you manage budgets, but lead people. The old approach of providing an occasional seminar or motivational speech for employees without making any fundamental changes in the way the organization operates will no longer work.

The total in total quality indicates a concern for quality in the broadest sense – what has come to be known as the "Big Q." Big Q refers to quality of products, services, people, processes, and environments. Correspondingly, "Little Q" refers to a narrower concern that focuses on the quality of one of these elements or individual quality criteria within an individual element.

Which Q Approach?

QMS implementation has to be a systemic approach but which system to choose depends where are you and how far the management is committed for quality. Each QMS requires companies to deploy various quality tools for the improvement of quality.

International Quality Awards

A focus on total quality has permeated organizations throughout the world. Numerous countries and regions of the world have established awards and award criteria.

The Malcolm Baldrige National Quality Award (MBNQA) has been one of the most powerful catalysts of total quality n the United States, and indeed, throughout the world. More importantly, the Award's Criteria for Performance excellence establishes a framework for integrating total quality principles and practices in any organization. Many other award programs are similar in nature to the Baldrige criteria.

The Deming Prize

The Deming Application Prize was instituted in 1951 by the Union of Japanese Scientists and Engineers (JUSE) in recognition and appreciation of W. Edwards Deming's achievements in statistical quality control and his friendship with the Japanese people. The Deming Prize has several categories, including prizes for individuals, factories, and small companies, and the Deming application prize, which is an annual award presented to a company or a division of a company that has achieved distinctive performance improvements through the application of Company-wide Quality Control (CWQC). As defined by JUSE, CWQC is

> A system of activities to assure that quality products and services required by customers are economically designed produced and supplied while respecting the principle of customer-orientation and the overall public well-being. These quality assurance activities involve market research, research and development, design, purchasing, production, inspection and sales, as well as all other related activities inside and outside the company. Through everyone in the company understanding both statistical concepts and methods, through their application to all the aspects of quality assurance and through repeating the cycle of rational planning, implementation, evaluation and action, CWQC aims to accomplish business objectives.[23]

The judging criteria consist of a checklist of 10 major categories: policies, the organization and its operations, education and dissemination, information gathering, communication and its utilization, analysis, standardization, control/management, quality assurance, effects, and future plans. Each major category is divided into subcategories, or "checking points." For example, the policy category includes policies pursued for management, quality, and quality control; methods for establishing policies; appropriateness and consistency of policies; utilization of statistical methods; communication and

dissemination of policies; checks of policies and the status of their achievement; and the relationship between policies and long- and short-term plans. Each category is weighted equally.

Hundreds of companies apply for the award each year. After an initial application accepted as eligible for the process, the company must submit a detailed description o its quality practices. Based on review of the written descriptions, only a few companies believed to be successful in CWQC are selected for a site visit. The site visit consists of a company presentation, in-depth questioning by examiners, and an executive session with top managers. Examiners visit plants and are free to ask any worker any question.

The Deming Prize is awarded to all companies that meet the prescribed standard. However, the small number of awards given each year is an indication of the difficulty of achieving the standard. The objectives are to ensure that a company has so thoroughly deployed a quality process that it will continue to improve long after a prize is awarded. The application process has no "losers." For companies that do not qualify, the examination process is automatically extended up to two times over three years.

European Quality Award

In October 1991, the European Foundation for Quality Management (EFQM) in partnership with the European Commission and the European Organization for Quality announced the creation of the European Quality Award. The award was designed to increase awareness throughout the European Community, and businesses in particular, of the growing importance of quality to their competitiveness in the increasingly global market and to their standards of life. The European Quality Award consists of two parts: the European Quality Prize, given to companies that demonstrate excellence in quality management practice by meeting the award criteria, and the European Quality Award, awarded to the most successful applicant. In 1992, four prizes and one award were granted for the first time.

The award process is similar to the Deming Prize and Baldrige Award. The assessment is based on customer satisfaction, business results, processes, leadership, people satisfaction, resources, people management, policy and strategy, and impact on society. Like Baldrige, results – including customer satisfaction, people (employee) satisfaction, and impact on society – constitute a high percentage of the total score. These are driven by "enablers" – constitute a high percentage of the total score. These are driven by "enablers" – the means by which an organization approaches its business responsibilities. The categories are roughly equivalent to those in Baldrige. However, the results criteria of people satisfaction, customer satisfaction, impact on society, and business results are somewhat different. The impact on society results category focuses on the perceptions of the company by the community at large and the company's approach to the quality of life, the environment, and the preservation of global resources. The European Quality Award criteria place greater emphasis on this category than is placed on the public responsibility item in the Baldrige Award criteria.

Canadian Awards for Business Excellence

Canada's National Quality Institute (NQI) recognizes Canada's foremost achievers of excellence through the prestigious Canada Awards for Excellence. NQI is a nonprofit organization designed to stimulate and support quality-driven innovation within all Canadian enterprises and institutions, including business, government, education, and health care. The Canadian Awards for Business Excellence quality criteria are similar in structure to the Baldrige Award Criteria, with some key differences. The major categories and items within each category are:

1. Leadership: strategic direction, leadership involvement, and outcomes.
2. Customer focus: voice of the customer, management of customer relationships, measurement, and outcomes.
3. Planning for improvement: development and content of improvement plan, assessment, and outcomes.

4. People focus: human resource planning, participatory environment, continuous learning environment, employee satisfaction, and outcomes.
5. Process optimization: process definition, process control, process improvement, and outcomes.
6. Supplier focus: partnering and outcomes.

Australian Business Excellence Awards

The Australian Quality Awards (now called Business Excellence Awards) were developed independently from the Baldrige Awards in 1988. The awards are administered by the Australian Quality Awards Foundation, a subsidiary of the Australian Quality council. Four levels of awards are given.

1. The Business Improvement Level: encouragement recognition for "Progress Toward Business Excellence" or "Foundation in Business Excellence";
2. The Award Level: representing Australian best practices; recognition as a winner or finalist;
3. The Award Gold Level: open only to former award winners; represents a revalidation and ongoing improvement;
4. The Australian Business Excellence Prize: open only to former award winners; represents international best practices evident throughout the organization.

As with Baldrige, the framework emphasizes the holistic and interconnected nature of the management process. The criteria are benchmarked with the Baldrige criteria and the European Business Excellence Model. One of the distinctive aspects of Australia's program is solid union support.

ISO 9000: what it is

The International Organization for Standardization (ISO) is a federation of the national standards bodies of nations from around the world. ISO 9000 is about standardizing the systemic approach organizations everywhere take to managing and improving the processes that ultimately result in their products and services. Specifically, ISO 9000 establishes the requirements for quality management systems (QMS) that must be employed by all organizations registered to the standard. Registered organizations should enjoy:

- Wider customer acceptance of products and services
- Improved effectiveness and reliability of its processes
- Improved quality of products and services
- Improved organizational performance and competitiveness

Since ISO 9000 was first released in 1987 it has evolved through two revisions, the first in 1994 and the most recent at the end of 2000. This evolution has aligned it more closely with the Total Quality Management philosophy. It seemed to many observers, including the authors, that the 1987 and 1994 versions shied away from association with TQM, or from acknowledging its existence. Even the 2000 version, which borrows heavily from TQM, scarcely acknowledges it. The fact is, of course, that with the tutelage of W. Edwards Deming and Joseph Juran, the Japanese started the development of the management system we now know as TQM in 1950. Over the years several Japanese experts – Kaoru Ishikawa, Shigeo Shingo, Taiichi Ono, and others – emerged, and by the early 1970s TQM had been widely accepted in Japan. By 1980 the Western world began taking note. By the time ISO 9000: 1987 was released, TQM was a mature management system, well understood by many in the West. It is clear that ISO's Technical Committee 176 (TC 176), which was charged with ISO 9000's development, borrowed some TQM elements, most notably its documentation requirements. ISO 9000: 1994 moved a bit closer to TQM, at least mentioning (though not requiring) continual improvement. But any acknowledgement of TQM's influence or superiority seemed to be deliberately avoided. ISO 9000:2000 made a giant leap in comparison, especially in the area of continual improvement, which has gone from receiving just cursory treatment to becoming a firm requirement.

Lesson # 20

BUSINESS EXCELLENCE MODELS

Excellence starts with 'Marketing'

The 'marketing' function of an organization must take the lead in establishing the true requirements for the product or service. Having determined the need, marketing should define the market sector and demand. This will determine product or service features such as the grade, price, quality, timings, etc. For example, a major hotel chain, before opening a new hotel or refurbishing an old one, will need to consider its location and accessibility, before deciding whether it will be predominantly a budget, first class, business or family hotel.

Marketing will also need to establish customer requirements by reviewing the market needs, particularly in terms of unclear or unstated expectations or preconceived ideas held by customers. Marketing is responsible for determining the key characteristics which determine the suitability of the product or service in the eyes of the customer. This may, of course, involve the use of market research techniques, data gathering, and analysis of customer complaints.

Excellent communication between customers and suppliers is the key to total organizational excellence. This will eradicate the 'demanding nuisance/idiot' view of customers, which pervades some organizations. Poor communications often occur in the supply chain between organizations, when neither party realizes how poor they are. Feedback from both customers and suppliers needs to be improved, where dissatisfied customers and suppliers do not communicate their problems. In such cases non-conformance of purchased products or services is often due to the customer's inability to communicate their requirements clearly. If these ideas are also used within an organization, then the internal supplier/customer interfaces will operate much more smoothly.

Marketing must also establish systems for feedback of customer information and reaction, which should be designed on a continuous monitoring basis. Any information pertinent to the product or service should be collected and collated, interpreted, analyzed, and communicated to improve the response to customer experience and expectations. These same principles must also be applied inside the organization for continuous improvement at every transformation process interface to be achieved. If one department has problems recruiting the correct sort of staff, and 'HR' have not established mechanisms for gathering, analyzing, and responding to information on new employees, then frustration and conflict will replace communication and co-operation.

Excellence in all functions

For an organization to be truly excellent, each part of it must work properly together. Each part, each activity, each person in the organization affects and is in turn affected by others. Errors have a way of multiplying and failure to meet the requirements in one part or area creates problems elsewhere, leading to yet more errors, yet more problems and so on. The benefits of getting it right first time everywhere are enormous.

Everyone experience – almost accepts – problems in working life. This causes people to spend a large part of their time on useless activities, correcting errors, looking for things, finding out why things are late, and checking suspect information, rectifying and reworking, apologizing to customers for mistakes, poor quality and lateness. The list is endless and it is estimated that about one-third of our efforts are wasted in this way. In the service sector it can be much higher.

Quality, the way we have defined it as meeting the customer requirements, gives people indifferent functions of an organization a common language for improvement. It enables all the people, with different abilities and priorities, to communicate readily with one another, in pursuit of a common goal. When business and industry was local, the craftsman could manage more or less on his own. Business is

now so complex and employs so many different specialist skills that everyone has to rely on the activities of others in doing their jobs.

Frameworks for Quality and Performance Excellence

The philosophies of Deming, Juran, and Crosby provide fundamental principles on which total quality is based. Business firms tend to be highly individualized. As a result, it is difficult to apply one specific philosophy. Company leaders must understand the differences and commonalties in the three philosophies and tailor an approach that fits their unique culture. Some of the most successful firms, such as Texas Instruments and Dana Corporation, have done this. Aspects of implementation are addressed further in chapter 11.

None of thee philosophies, however, provide a framework for how to implement total quality within an organization or a means of assessing total quality efforts relative to one's peers or world-class companies. Award criteria and certification procedures fill this important role. The two most prominent frameworks for quality that have had world-wide influence are ISO 9000 and the Malcolm Baldrige National Quality Award Criteria.

The Malcolm Baldrige National Quality Award

In this section we present an overview of the Award, the Criteria, and the Award Process. The Baladrige Award recognizes U.S. companies that excel in quality management practice and performance. The Baldrige Award does not exist simply to practice and performance. The Baldrige Award does not exist simply to recognize product excellence, nor does it exist for the purposes of "winning." Its principal focus is on promoting high-performance management practices that lead to customer satisfaction and business results. Up to three companies can receive an award in each of the categories of manufacturing, small business, service, nonprofit health care, and nonprofit education. Health care and education award categories were established in 1999.

The purposes of the award are to

- Help stimulate American companies to improve quality and productivity for the pride of recognition while obtaining a competitive edge through increased profits;
- Recognize the achievements of those companies that improve the quality of their goods and services and provide an example to others;
- Establish guidelines and criteria that can be used by business, industrial, governmental, and other enterprises in evaluating their own quality improvement efforts; and
- Provide specific guidance for other American enterprises that wish to learn how to manage for high quality by making available detailed information on how winning enterprises were able to change their cultures and achieve eminence.

The Criteria for Performance Excellence

The award examination is based upon a rigorous set of criteria, called the Criteria for Performance Excellence, designed to encourage companies to enhance their competitiveness through an aligned approach to organizational performance management that result in:

1. Deliver of ever-improving value to customers, contributing to marketplace success.
2. Improvement of overall company performance and capabilities
3. Organizational and personal learning

The criteria consist of a hierarchical set of categories, items, and areas to address. The seven categories are

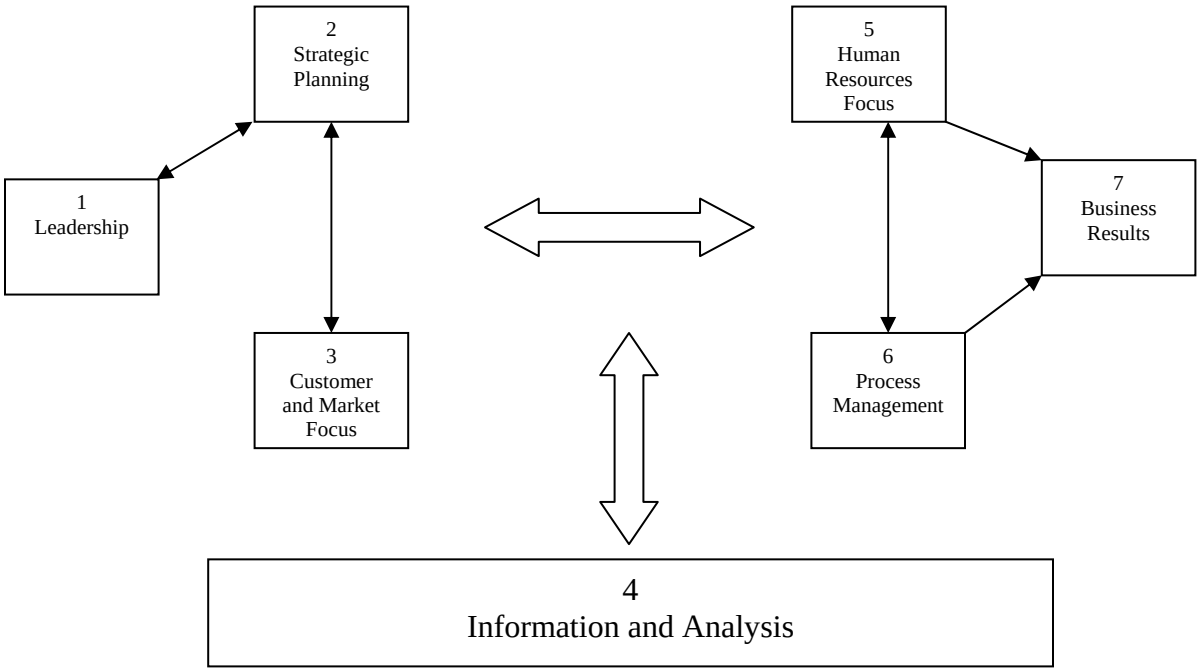
1. Leadership: This category examines how an organization's senior leaders address values, direction, and performance expectations, as well as their focus on customer s and other stakeholders, empowerment, innovation, and learning. Also examined is how an organization addresses its responsibilities to the public and supports its key communities.
2. Strategic Planning: this category examines how an organization develops strategic objectives and action plans. Also examined are how chosen strategic objectives and action plans are deployed and how progress is measured.
3. Customer and Market Focus: This category examines how an organization determines requirements, expectations, and preferences of customer s and markets. Also examined is how the organization builds relationships with customers and determines the key factors that lead to customer acquisition, satisfaction, and retention and to business expansion.
4. Information and Analysis: This category examines an organization's information management and performance measurement systems and how the organization analyzes performance data and ensures hardware and software quality.
5. Human Resource Focus: This category examines how an organization motivates and enables employees to develop and utilize their full potential in alignment with the organization's overall objectives and action plans. Also examined are the organization's efforts to build and maintain a work environment and an employee support climate conducive to performance excellence and to personal and organizational growth.
6. Process Management: This category examines the key aspects of an organization's process management, including customer-focused design, product and service delivery, key business, and support processes. This category encompasses all key processes and all work units.
7. Business Results: This category examines an organization's performance and improvement in key business areas – customer satisfaction, product and service performance, financial and marketplace performance, human resource results, and operational performance. Also examined are performance levels, relative to those of competitors.

The seven categories form an integrated management system. The umbrella over the seven categories reflects the focus that organizations must have on customers through their strategy and action plans for all key decisions. Leadership, Strategic Planning, and Customer and Market Focus represent the "leadership triad," and suggest the importance of integrating these three functions. Human Resource focus and Process Management represent how the work in an organization is accomplished and leads to Business Results. These functions are linked to the leadership triad.

Malcolm Baldrige National Quality Award Criteria Framework

Baldrige Award Criteria Framework
A systems Perspective

Organizational Profile:
Environment, Relationships, and Challenges



Each category consists of several items (numbered 1.1, 1.2, 2.1, etc.) or major requirements on which businesses should focus. For example, the Leadership Category consists of the following items and areas to address:

1.1 Organizational Leadership
- a. Senior Leadership Direction
- b. Organizational Performance Review

1.2 Public Responsibility and Citizenship
- a. Responsibilities to the Public
- b. Support of Key Communities

The Senior Leadership Direction area asks organizations to answer the following questions:

- How do senior leaders set and deploy organizational values, short-and longer-term directions, and performance expectations, including a focus on creating and balancing value for customers and other stakeholders? Include how senior leaders communicate values, directions, and expectations through your leadership system and to all employees.
- How do senior leaders create an environment for empowerment, innovation, organizational agility, and organizational and employee learning?

One thing the criteria do not do is prescribe specific quality tolls, techniques, technologies, systems, or starting points. Companies are encouraged to develop and demonstrate creative, adaptive, and flexible approaches to meeting basic requirements. Many innovative approaches have been developed by Baldrige winners and are now commonly used by many other companies.

Baldrige Award Item Point Values

2002 Categories/Items			Point Values
1.	**Leadership**		**120**
	1.1	Organizational Leadership. … ..……..	80
	1.2	Public Responsibility and Citizenship …… ….	40
2.	**Strategic Planning**		**85**
	2.1	Strategy Development. ..……..	40
	2.2	Strategy Development. …….	45
3.	**Customer and Market Focus**		
	3.1	Customer and Market Knowledge. . …….	40
	3.2	Customer Satisfaction and Relationships. ……	45
4.	**Information and Analysis**		**90**
	4.1	Measurement and Analysis of Organizational Performance ……	50
	4.2	Information Management. ……	40
5.	**Human Resources Focus**		**85**
	5.1	Work systems. …….	35
	5.2	Employee Education, Training, and Development. …….	25
	5.3	Employee Well-Being and Satisfaction. . ……	25
6.	**Process Management**		**85**
	6.1	Product and Service Processes……..……	55
	6.2	Business Process. ……	15
	6.3	Support Processes…..……	15
7.	**Business Results**		**450**
	7.1	Customer-Focused Results ……	125
	7.2	Financial and Market Results ……..	125
	7.3	Human Resource Results ……..	80
	7.4	Organizational Effectiveness Results ……..	120
	Total Points ……		**1, 000**

ISO 9000 (2000) International Quality Management System

As quality became a major focus of businesses throughout the world, various organizations developed standards and guidelines. Terms such as *quality management, quality control, quality system, and quality assurance* acquired different, and sometimes conflicting meanings from country to country, within a country, and even within an industry.10 As the European Community moved toward the European free trade agreement, which went into effect at the end of 1992, quality management became a key strategic objective. To standardize quality requirements for European countries within the common market and those wishing to do business with those countries, a specialized agency for standardization, the International Organization for Standardization, founded in 1946 and composed of representatives from the national standards bodies of 91 nations, adopted a series of written quality standards in 1987, which were revised in 1994, and again (significantly) in 2000. The most recent version is called the ISO 9000:2000 family of standards.

ISO 9000 is an international quality standard for goods and services. The term *quality standard* tends to be misleading. For example, ISO 9000 does not set any specifications for quality. Rather, it sets broad requirements for the assurance of quality and for management's involvement. The emphasis is on prevention rather than inspection and rework. In fact, this emphasis is placed not only on the production process but also on the product design process. The ISO 9000 approach is completely compatible with the total quality philosophy, though it is not as all encompassing. ISO 9000 is composed of three standards:

ISO 9000:2000 Quality Management Systems – Fundamentals and Vocabulary
ISO 9001:2000 Quality Management Systems – Requirements
ISO 9004:2000 Quality Management Systems – Guidelines for Performance Improvements

ISO 9000 Can Improve Operations in a Traditional Environment

By "traditional environment," we mean an organizational environment that has persisted in companies for decades, until the Total Quality Management movement began to change things. A traditional organizational environment is one which still operates according to the "old way of doing things" rather than according to the principles of Total Quality Management.

When ISO 9000 is implemented by a traditional organization, the company should be the better for it. We will not go so far as to say it will be the better for it, because much depends on the organization's reasons for adopting ISO 9000 and the degree of executive-level commitment to it. Put another way, if ISO 9000 is approached inappropriately and for the wrong reasons, it can become nothing more than a marketing ploy, and the organization's functional departments might develop even more problems than they had before ISO 9000.

ISO 9000 May be Redundant in a Mature TQM Environment

Just as ISO 9000 should help traditional organizations, it should also benefit TQM organizations. However, in an organization that has achieved a high level of maturity in its total quality journey, say in the 400-600 range on the Baldrige scale of 1,000 points, all ISO 9000 criteria may already be in place. In such a case, the only compelling reason for registration under ISO 9000 would be for marketing purposes. What would a company such as Toyota gain from ISO 9000 registration? Probably nothing. It already does everything required by ISO 9000. Its products and processes are recognized as world class. Consequently, It wouldn't gain even a marketing advantage. However, there are many fine TQM organizations that are not as well known as Toyota. Such organizations, even though they may already meet or exceed the requirements of ISO 9000, may find it necessary to register in order to let potential customers know that their products or services satisfy the international standard.

For Software and IT companies, the standard which is more acceptable and regarded worldwide is called CMMI levels 1-5.

ISO 9000 and TQM are not in Competition

This is not case of one or the other. Organizations can adopt TQM or ISO 9000, or both. While there may be those who advocate one to the exclusion of the other, in the larger scheme of things, the two concepts fit well with each other. Both have worthwhile and similar aims. Our view is those not only are TQM and ISO 9000 compatible; they actually support each other and are complementary. There are good reasons for using both in a single management system.

Management Motivation for Registration to ISO 9000

Management motivation for adopting either ISO 9000 or TQM can vary widely. There are both appropriate and inappropriate motives. For example, if a company seeks ISO 9000 registration to obtain

a marketing advantage, its motive is inappropriate. As a result, the organization will likely give mere lip service to adopting the standard. Appropriate motives for adopting ISO 9000 include the following:

- To improve operations by implementing a quality management system that satisfies the ISO 9000 requirements for management responsibility; resource management; product realization; and measurement, analysis, and improvement
- To create or improve a quality management system that will be recognized by customers worldwide.
- To improve product or service quality r the consistency of quality
- To improve customer satisfaction.
- To improve competitive posture
- To conform to the requirements of one or more major customers (although adoption would be better motivated by internal consideration, such as the preceding five)

What we are saying here is that, ideally, management will adopt ISO 9000 as a way to make real improvements in the company's operations, serve its customers in a more responsible way, and, as a result, be more successful. This approach is more likely to assure commitment and participation by top management. Approaching ISO 9000 from a strictly marketing perspective may result in a negative reaction t the amount of work required by the functional departments, ad only enough management commitment to do the bare minimum for registration. In other words, if ISO 9000 is viewed as a necessary evil that one must adopt to compete in certain markets, every dollar and every hour spent on ISO 9000 will be seen as a burden to be endured rather than an investment in the organization's future. By definition, a burden is a load that is difficult to bear; the connotation is negative. When negative feelings abound among employees, commitment to ISO 9000 will suffer. It may be possible to fool the ISO 9000 registrar's auditor, but we guarantee that customers will not be fooled – at least not for long. Newfound markets will soon wither and disappear. If ISO 9000 is to have a real and permanent effect, it must be approached with a positive attitude and the unwavering commitment of top management.

Lesson # 21

DESIGNING ORGANIZATIONS FOR QUALITY

For design, development and implementation of a QMS, the ISO 9000 approach is completely compatible with the total quality philosophy, though it is not as all encompassing. ISO 9000 is composed of three standards:

ISO 9000:2000	Quality Management Systems – Fundamentals and Vocabulary
ISO 9001:2000	Quality Management Systems – Requirements
ISO 9004:2000	Quality Management Systems – Guidelines for Performance Improvements

ISO 9001 and ISO 9004 are known as Consistent Pair and are based and follow PDCA methodology. ISO system is about standardizing the approach organizations everywhere take in managing and improving the processes that ultimately result in producing better quality products and services. Specifically, ISO 9001(2000) establishes the requirements for quality management systems (QMS) that must be employed by all organizations registered to the standard. Registered organizations should enjoy:

- Wider customer acceptance of products and services
- Improved effectiveness and reliability of its processes
- Improved quality of products and services
- Improved organizational performance and competitiveness

By the time ISO 9000: 1987 was released, TQM was a mature management system, well understood by many in the West. It is clear that ISO's Technical Committee 176 (TC 176), which was charged with ISO 9000's development, borrowed some TQM elements, most notably its documentation requirements. ISO 9000: 1994 moved a bit closer to TQM, at least mentioning (though not requiring) continual improvement. ISO 9000:2000 made a giant leap in comparison, especially in the area of continual improvement, which has gone from receiving just cursory treatment to becoming a firm requirement. In addition, the standard now incorporates eight quality management principles that come directly from TQM. They are:

1. **Customer focus** – understanding customer's needs, striving to exceed their expectations.
2. **Leadership** – establishing direction, unity of purpose, and a supportive work environment.
3. **Involvement of people** – ensuring that all employees at all levels are able to fully use their abilities for the organization's benefit.
4. **Process approach** – recognizing that all work is done through processes, and managing them accordingly.
5. **System approach to management** – expands on the previous principle in that achieving any objective requires a system of interrelated processes.
6. **Continua improvement** – as a permanent organizational objective, recognizing and acting on the fact that no process is so good that further improvement is impossible.
7. **Factual approach to decision making** – acknowledging that sound decisions must be based on analysis of factual data and information.
8. **Mutually beneficial supplier relationships** – to take advantage of the synergy that can be found in such relationships.

By design, as a result of ISO 9000, any organization supplying products or service is able to develop and employ a quality management system that is recognized by customers worldwide. Customers around the globe who deal with ISO 9000-registrered organizations can expect that purchased goods or services will conform to a set o recognized standards.

ISO 9001's requirements for quality management systems are generic in nature, and are applicable to organizations in any industry or economic sector. Whether the organization manufactures a product or

provides a service, whether it is a company or a governmental agency, whether it is large or small, ISO 9000 can apply, and be used to advantage.

To be registered the organization must go through a process that includes the following steps:

1. Develop (or upgrade) a quality manual that describes how the company will assure the quality of its products or services.
2. Document procedures (or upgrade existing documentation) that describe how the various processes for design, production, continual improvement, and so forth, will be operated. This must include procedures for management review/audits and the like.
3. The organization must provide evidence of top management's commitment to the QMS and its continual improvement.
4. The organization's top management must ensure that customer requirements are determined and met.
5. The organization must hire an accredited registrar company to examine its systems, processes, procedures, quality manual, and related items. If everything is in order, registration will be granted. Otherwise, the registrar will inform the company of which areas require work (but will not inform the company specifically what must be done), and a second visit will be scheduled.
6. Once registration is accomplished, the company will conduct its own internal audits to ensure that the systems, processes, and procedures are working as intended.
7. Also once registered, the outside registrar will make periodic audits for the same purpose. These audits must be passed to retain registration.

An important point to understand about ISO 9000 is that the organization has to respond to all ISO 9000 requirements and tell the registrar specifically what it is going to do and how. ISO does not tell the organization. Assuming the registrar agrees with the organization's plan, registration is awarded. To retain that registration, the *organization must do what it said it would do*.

Before the advent of the year 2000 release, ISO 9000 was concerned only with the standards which an organization could build its own version of a quality management system. ISO 9000:2000 has closed much of the gap that existed with TQM. The primary remaining difference between ISO 9000 and TQM is in the degree to which the total organization is involved, ISO 9000 does not require the QMS to include functions and levels that do not play a direct role in the management and execution of the product/service realization processes. Functions that are typically not involved under the QMS include human resources, finance (accounting), sales, and marketing.

Characteristics of Total Quality Management	ISO 9000:2000	TQM
Customer focus (internal and external)		✓
Obsession with quality	✓	✓
Scientific approach to problem solving	✓	✓
Long-term commitment	Partial	✓
Teamwork		✓
Continual process and product improvement	✓	✓
Education and training intensive	✓	✓
Freedom through control		✓
Unity of purpose	✓	✓
Employee involvement and empowerment	Partial	✓

Total Quality Management Characteristics Compared with ISO 9000

In comparison, the ISO 9000 quality management system is designed to "provide the framework for continual improvement to increase the probability of enhancing customer satisfaction and the satisfaction of other interested parties. It provides confidence to the organization and its customers that

it is able to provide products that consistently fulfill requirements." ISO claims that beyond customer satisfaction, cost and risk-management benefits will also accrue to the organization. These benefits translate to improved competitiveness – the same as TQM's objective. ISO claim these benefits result from emphasizing the eight quality management principles on which the standard is based. Following table provides a comparison of ISO's eight quality management principles with Deming's Fourteen Points and TQM.

ISO 9000's Eight Quality Management Principles	Deming's 14 Points	TQM
1. Customer focus		✓
2. Leadership	#1, #2, #7	✓
3. Involvement of people		✓
4. Process approach		✓
5. System approach to management		✓
6. Continual improvement	#5	✓
7. Factual approach to decision making		✓
8. Mutually beneficial supplier relationships	#4	✓

ISO 9000 is Compatible with, and can be viewed as a Subset of, TQM

Clearly, TQM and ISO 9000 is not quite the same thing. However, there is nothing inherent in ISO 9000 that would prevent it from becoming part of a larger Total Quality Management environment. There are many examples today of companies that have

ISO 9000's Quality Management Principles versus Deming's Fourteen Points and TQM successfully included ISO 9000 as part of a larger total quality effort. Organizations that are already at some level of TQM maturity or CMMI level 3 maturities have typically found it easy to implement ISO 9000. This is because a TQM environment with its infrastructure of top management commitment, documented processes and procedures, continuous improvement, obsession with quality, and so on, easily supports the requirements of ISO 9001(2000).

Designing an ISO 9000 QMS Can Improve Market Perception in Global Post WTO World

A traditional organizational environment is one which still operates according to the "old way of doing things" rather than according to the principles of Total Quality Management and the technology based networked post WTO world. In Pakistan, you might say, an organization being run as an autocratic, non-participatory and "SAITH" like organization as many in Sialkot, Guranwala, Faisalabad, Lahore, and Karachi etc.

When ISO 9000 is implemented by a traditional organization, in its real spirit but much depends on the organization's reasons for adopting ISO 9000 and the degree of executive-level commitment to it. Let us take a look from a different view, if ISO 9000 is designed and developed for the wrong reasons, it can not become a good marketing tool, and the organization's functional departments especially operations and QA , might develop even more problems than they had before ISO 9000. Once again QMS principles are taken in its letter and spirit.

The eight quality management principles are defined and detailed in ISO 9004:2000, *Quality management systems Guidelines for performance improvements*.

- Principle 1 Customer focus
- Principle 2 Leadership
- Principle 3 Involvement of people
- Principle 4 Process approach

- Principle 5 System approach to management
- Principle 6 Continual improvement
- Principle 7 Factual approach to decision making
- Principle 8 Mutually beneficial supplier relationships

Principle 1: Customer focus:

Organizations depend on their customers and therefore should understand current and future customer needs, should meet customer requirements and strive to exceed customer expectations

Key benefits:

- Increased revenue and market share obtained through flexible and fast responses to market opportunities.
- Increased effectiveness in the use of the organization's resources to enhance customer satisfaction.
- Improved customer loyalty leading to repeat business.

Applying the principle of customer focus typically leads to:

- Researching and understanding customer needs and expectations.
- Ensuring that the objectives of the organization are linked to customer needs and expectations.
- Communicating customer needs and expectations throughout the organization.
- Measuring customer satisfaction and acting on the results.
- Systematically managing customer relationships.
- Ensuring a balanced approach between satisfying customers and other interested parties (such as owners, employees, suppliers, financiers, local communities and society as a whole).

Principle 2: Leadership:

Leaders establish unity of purpose and direction of the organization. They should create and maintain the internal environment in which people can become fully involved in achieving the organization's objectives.

Key benefits:

- People will understand and be motivated towards the organization's goals and objectives.
- Activities are evaluated, aligned and implemented in a unified way.
- Miscommunication between levels of an organization will be minimized.

Applying the principle of leadership typically leads to:

- Considering the needs of all interested parties including customers, owners, employees, suppliers, financiers, local communities and society as a whole.
- Establishing a clear vision of the organization's future.
- Setting challenging goals and targets.
- Creating and sustaining shared values, fairness and ethical role models at all levels of the organization.
- Establishing trust and eliminating fear.

- Providing people with the required resources, training and freedom to act with responsibility and accountability.
- Inspiring, encouraging and recognizing people's contributions.

Principle 3: Involvement of people:

People at all levels are the essence of an organization and their full involvement enables their abilities to be used for the organization's benefit.

Key benefits:

- Motivated, committed and involved people within the organization.
- Innovation and creativity in furthering the organization's objectives.
- People being accountable for their own performance.
- People eager to participate in and contribute to continual improvement.

Applying the principle of involvement of people typically leads to:

- People understanding the importance of their contribution and role in the organization.
- People identifying constraints to their performance.
- People accepting ownership of problems and their responsibility for solving them.
- People evaluating their performance against their personal goals and objectives.
- People actively seeking opportunities to enhance their competence, knowledge and experience.
- People freely sharing knowledge and experience.
- People openly discussing problems and issues.

Principle 4: Process approach:

A desired result is achieved more efficiently when activities and related resources are managed as a process.

Key benefits:

- Lower costs and shorter cycle times through effective use of resources.
- Improved, consistent and predictable results.
- Focused and prioritized improvement opportunities.

Applying the principle of process approach typically leads to:

- Systematically defining the activities necessary to obtain a desired result.
- Establishing clear responsibility and accountability for managing key activities.
- Analyzing and measuring of the capability of key activities.
- Identifying the interfaces of key activities within and between the functions of the organization.
- Focusing on the factors such as resources, methods, and materials that will improve key activities of the organization.
- Evaluating risks, consequences and impacts of activities on customers, suppliers and other interested parties.

Principle 5: System approach to management:

Identifying, understanding and managing interrelated processes as a system contributes to the organization's effectiveness and efficiency in achieving its objectives.

Key benefits:

- Integration and alignment of the processes that will best achieve the desired results.
- Ability to focus effort on the key processes.
- Providing confidence to interested parties as to the consistency, effectiveness and efficiency of the organization.

Applying the principle of system approach to management typically leads to:

- Structuring a system to achieve the organization's objectives in the most effective and efficient way.
- Understanding the interdependencies between the processes of the system.
- Structured approaches that harmonize and integrate processes.
- Providing a better understanding of the roles and responsibilities necessary for achieving common objectives and thereby reducing cross-functional barriers.
- Understanding organizational capabilities and establishing resource constraints prior to action.
- Targeting and defining how specific activities within a system should operate.
- Continually improving the system through measurement and evaluation.

Principle 6: Continual improvement:

Continual improvement of the organization's overall performance should be a permanent objective of the organization.

Key benefits:

- Performance advantage through improved organizational capabilities.
- Alignment of improvement activities at all levels to an organization's strategic intent.
- Flexibility to react quickly to opportunities.

Applying the principle of continual improvement typically leads to:

- Employing a consistent organization-wide approach to continual improvement of the organization's performance.
- Providing people with training in the methods and tools of continual improvement.
- Making continual improvement of products, processes and systems an objective for every individual in the organization.
- Establishing goals to guide, and measures to track, continual improvement.
- Recognizing and acknowledging improvements.

Principle 7 Factual approach to decision making:

Effective decisions are based on the analysis of data and information

Key benefits:

- Informed decisions.

- An increased ability to demonstrate the effectiveness of past decisions through reference to factual records.
- Increased ability to review, challenge and change opinions and decisions.

Applying the principle of factual approach to decision making typically leads to:

- Ensuring that data and information are sufficiently accurate and reliable.
- Making data accessible to those who need it.
- Analyzing data and information using valid methods.
- Making decisions and taking action based on factual analysis, balanced with experience and intuition.

Principle 8: Mutually beneficial supplier relationships:

An organization and its suppliers are interdependent and a mutually beneficial relationship enhances the ability of both to create value

Key benefits:

- Increased ability to create value for both parties.
- Flexibility and speed of joint responses to changing market or customer needs and expectations.
- Optimization of costs and resources.

Applying the principles of mutually beneficial supplier relationships typically leads to:

- Establishing relationships that balance short-term gains with long-term considerations.
- Pooling of expertise and resources with partners.
- Identifying and selecting key suppliers.
- Clear and open communication.
- Sharing information and future plans.
- Establishing joint development and improvement activities.
- Inspiring, encouraging and recognizing improvements and achievements by suppliers.

Lesson # 22

DEVELOPING ISO QMS FOR CERTIFICATION

DEVELOPMENT, IMPLEMENTATION AND REGISTRATION

The ISO 9000 standards originally were intended to be advisory in nature and to be used for two-party contractual situations (between a customer and supplier) and for internal auditing. However, they quickly evolved into criteria for companies who wished to "certify" their quality management or achieve "registration" through a third-party auditor, usually a laboratory or some other accreditation agency (called a registrar). This process began in the United Kingdom. Rather than a supplier being audited for compliance to the standards by each customer, the registrar certifies the company, and this certification is accepted by all of the supplier's customers.

The registration process includes document review by the registrar of the quality system documents or quality manual; pre-assessment, which identifies potential noncompliance in the quality system or in the documentation; assessment by a team of two or three auditors of the quality system and its documentation; and surveillance, or periodic re-audits to verify conformity with the practices and systems registered. During the assessment, auditors might ask such question as (using management responsibility as an example): Does a documented policy on quality exist? Have job descriptions for people who manage or perform work affecting quality been documented? Are descriptions of functions that affect quality been documented? Are descriptions of functions that affect quality available? Has management designated a person or group with the authority to prevent nonconformities in products, identify and record quality problems, and recommend solutions? What means are used to verify the solutions?

Re-certification is required every three years. Individual sites – not entire companies – must achieve registration individually. All costs are borne by the applicant, so the process can be quite expensive.

Perspectives on ISO 9000:2000

ISO 9000 provides a set of good basic practices for initiating a quality system, and is an excellent starting point for companies with no formal quality assurance program. In fact, it provides detailed guidance on process and product control. Thus, for companies in the early stages of developing a quality program, the standards enforce the discipline of control that is necessary before they can seriously pursue continuous improvement. The requirements of periodic audits reinforce the stated quality system until it becomes ingrained in the company. Thus, using ISO 9000 as a basis for a quality system can improve discipline, process, productivity, decrease costs, and increase customer satisfaction.

ISO 9000 as a Quality Journey and not as a Destination

How to get started is always an issue for organizations just beginning their total quality journey.

The ISO 9000 development effort will benefit by having the following components: an executive-level steering committee, a vision with the guiding principles, a set of broad objectives, baselines on employee and customer satisfaction, an objective view of the organization's strengths and weaknesses, and an indication of which employees at all levels can be counted on for support during the implementation. In addition, the organization will have a well thought out means of communicating with employees and all other stakeholders to keep them apprised of the changes taking place, why they are happening, and what they will mea to everyone.

The development and implementation of an organization's quality management system is influenced by its varying needs, its particular objectives, the products it provides, and the processes it employs. It is not the purpose of this ISO to imply uniformity of quality management systems.

The selection of the appropriate quality related processes described in this ISO Standard and the extent to which these processes are adopted and applied by an organization depends upon factors such as its size and structure, the market being served and the resources available.

The purpose of an organization is:

a) To identify and meet the needs and expectations of its customers and other interested parties (i.e. employees, suppliers, owners, society), to achieve competitive advantage, and to do this in an effective and efficient manner;
b) To achieve, maintain, and improve overall organizational performance and capabilities.

The application of quality management principles not only provides direct benefits but also makes an important contribution to managing costs and risks. Benefit, cost and risk considerations are important for the organization, its customers and other interested parties. These considerations on overall performance may impact on the following:

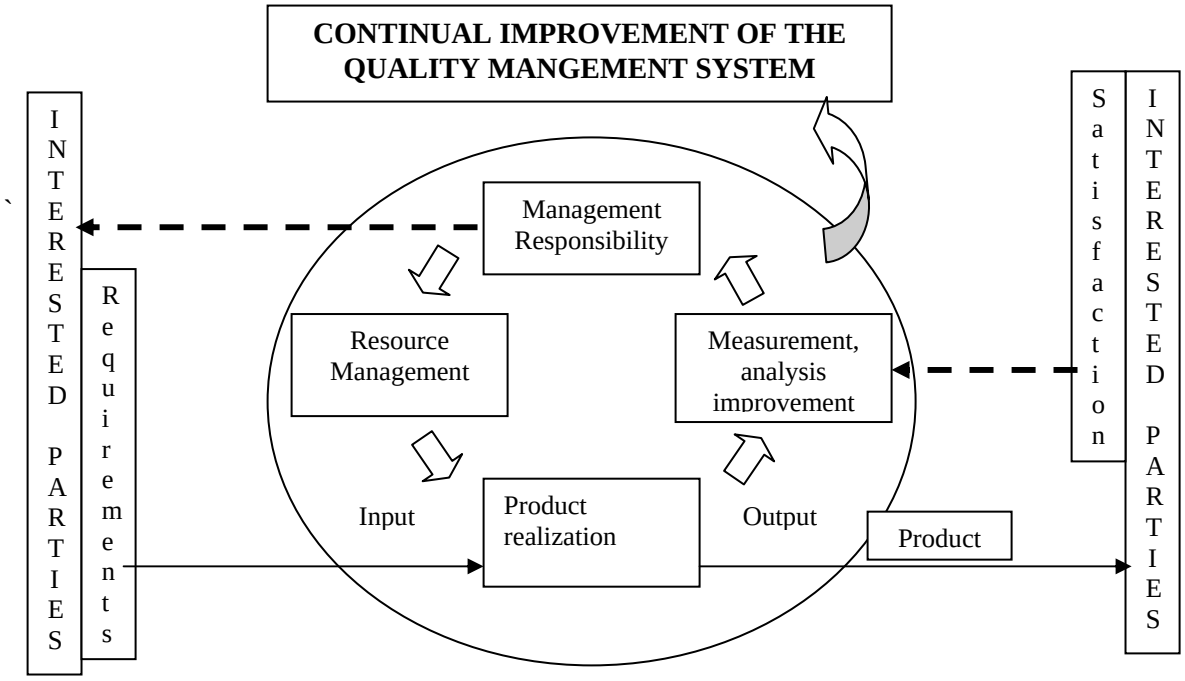
a} Revenue (turnover), profits and market share; these may be increased by such aspects as leadership, increased efficiency, improved employee performance, and employee and customer satisfaction;
b) Costs due to resources needed for business; inadequate resource funding is likely to cause losses and be a competitive disadvantage through the sale of deficient products.

Process approach

The ISO-9001(2000) Standard encourages the adoption of a process approach to quality management. Any activity which receives inputs and converts them to outputs can be considered as a process. For organizations to function effectively, they have to identify and manage numerous inter-linked processes. Often the output from one process will directly form the input into the next process. The systematic identification and management of the processes employed by an organization, and the interactions between such processes, may be referred to as the 'process approach’.

Following Figure is a conceptual illustration of one of the process approach. The model recognizes that customers and other interested parties play a significant role in defining inputs. Monitoring the satisfaction of customers and other interested parties is necessary to evaluate and validate whether the requirements of customers and other interested parties have been met. This model does not reflect processes at a detailed level, but covers all the contents of the ISO Standard.

The purpose of ISO 9001 is to define the minimum Quality Management System requirements needed to achieve customer satisfaction by meeting specified product requirements. Compliance with ISO 9001 may be used by an organization to demonstrate its capability to meet customer requirements.



Terms and definitions

For the purposes of this ISO 9001(2000) International Standard, the terms and definitions given in ISO 9000:2000, are applied in following way.

Supplier --------- >Organization ---------- >Customer (Interested Parties)

The term "organization" replaces the previously used term "supplier", to mean the unit to which this International Standard applies. The term "supplier" is now used instead of the previous term "subcontract". The changes have been introduced to reflect the vocabulary used by organizations.

Product as a result of a Process

There are four agreed generic product categories as per ISO-9000:

- Hardware,
- Software,
- Services,
- Processed materials.

Most products are combinations of some of the four generic product categories.
Whether the combined product is then called hardware, processed material, software or service depends on the dominant element.

Following is one of the model methodology which can be used to develop the documentation for QMS and to get ready for certification by implementing clause by clause requirements (in the box) as given in ISO 9001(2000) as the minimum requirement for certification and one can also take help from the guidelines given in ISO-9004(2000) as presented below after the boxes.

ISO Quality Management System – Requirements/Guidelines

ISO 9001:2000 - Quality management systems -.Requirements

General requirements

The organization shall establish, document, implement, maintain a quality management and continually improve its effectiveness in accordance with the requirement of this International Standard.

The organization shall:

a) Identify the processes needed for the quality management system and their application throughout the organization (see 1.2)
b) Determine the sequence and interaction of these processes;
c) Determine criteria and methods needed to ensure that both the operation and control of the processes are effective,
d) Ensure the availability of resources and information necessary to support the operation and monitoring of these processes;
e) Measure, monitor and analyze these processes, and
f) Implement action necessary to achieve planned results and continual improvement these processes.

These processes shall be managed by the organization in accordance with the requirements of this International Standard.

Where an organization chooses to outsource any process that affects product conformity with requirements, the organization shall ensure control over such processes.
NOTE Processes needed for the quality management system referred to above should include processes for management activities, provision of resources, product realization and measurement.

Quality management system guidelines

Managing systems and processes

Leading and operating an organization successfully requires managing it in a systematic and visible manner. Success should result from implementing and maintaining a management system that is designed to continually improve performance by addressing the needs of all interested parties. Managing an organization encompasses quality management, among other management disciplines.

The quality management system of an organization is an important part of the overall management system. Organizations should define their systems and the processes contained within them to enable the systems and processes to be clearly understood, managed and improved. Management should ensure effective operation and control of processes and the measures and data used to determine satisfactory performance. The management of the organization should closely monitor the movement toward performance improvement. The activities and processes that can lead to performance improvement should be described and defined by the management. In general, to fulfill the requirements of ISO standard;

First, Company should state (write/document) what do they want to do
Second, do the work as was stated and documented
Third, check them, weather the work is being carried out as was stated. See if there are any gaps .

Fourth, Show and prove to an external auditor that work is really being done as was stated in the first place.

So what in terms of documentation required is a manual altogether in one volume to be called as ISO 9000 QMS Manual or can be separated into following manuals:

1. Quality Policy Manual
2. Quality Procedures Manual
3. Quality Work Instructions
4. Quality Records Manual or Quality Data Collection Manual

Documentation and records may be in any form or in any media suitable for the needs of the organization.

Requirements for documentation and records may arise from

- contractual requirements from the customer or other interested parties,
- acceptance of international, national, regional and industry sector standards,
- relevant statutory and regulatory requirements, or
- decisions by the organization.

ISO 9001:2000 – Quality management systems -Requirements

Documentation Requirements
General

The quality management system documentation shall include:

a) Documented statements of a quality policy and quality objectives
b) A quality manual
c) Documented procedures required by this International Standard;
d) Documents needed by the organization to ensure the effective planning, operation and control

Use of quality management principles

ISO 9001:2000 – Quality management systems -Requirements

Documentation Requirements
Quality Manual

The organization shall establish and maintain a quality manual that includes

a) The scope of the quality management system, including details of and justification for any exclusions (see 1.2),
b) The documented procedures established for the quality management system, or reference to them, and
c) A description of the interaction between the processes of the quality management system.

Control of Documents

Documents required by the quality management system shall be controlled. Records are a special type of document and shall be controlled according to the requirements given in 4.2.4.

A documented procedure shall be established to define the controls needed.

a) to approve documents for adequacy prior to issue,
b) to review and update as necessary and re-approve documents,

c) to ensure that changes and the current revision status of documents are identified,
d) to ensure that relevant versions of applicable documents are available at points of use,
e) to ensure that documents remain legible and readily identifiable,
f) to ensure that documents of external origin are identified and their distribution controlled, and
g) to prevent the unintended use of obsolete documents, and to apply suitable identification to them if they are retained for any purpose.

Control of Records

Records shall be established and maintained to provide evidence o conformity to requirements and of the effective operation of the quality management system. Records shall remain legible, readily identifiable and retrievable. A documented procedure shall be established to define the controls needed for the identification, storage, protection, retrieval, retention time and disposition of records.

Documentation and Records

Management should define the documentation needed to support the quality management system. The nature and extent of the documentation should support the needs of tile organization. The defined documentation should provide for implementation, maintenance and improvement of the system.

This documentation typically includes

- policy documents including the quality manual
- documentation for control of processes,
- work instructions for defined tasks,
- standard formats for collection and reporting of data and
- quality records.

The primary purpose of quality documentation is to express the quality policy and to describe the quality management system. This documentation serves as the basis for implementation and maintenance of the system. Suitable documentation should be available to achieve the effective operation of the quality management system.

Documentation control should be defined and implemented to ensure that correct documents arc used. All obsolete documents should be promptly removed from all points of issue and use, or otherwise prevented from unintended use.

Documents to be retained, and records of quality performance, should be controlled, maintained and protected.

The organization should ensure that sufficient records be maintained to demonstrate conformance to requirements and verify effective operation of the quality management system. These records can also provide know1edge for maintenance and improvement of the quality management system.

Quality records should be analyzed to provide inputs for corrective and preventive action, and process improvements. Analysis of records may also provide information for use in the improvement of the Quality management system.

Lesson # 23

ISO 9001(2000) QMS MANAGEMENT RESPONSIBILITY

MANAGEMENT RESPONSIBILITY - REQUIREMENTS
ISO 9001:2000-QUALITY MANAGEMENT SYSTEMS -REQUIREMENTS
MANAGEMENT COMMITMENT

Top management shall provide evidence of its commitment to the development and implementation of the quality management system and continually improving its effectiveness by:

a) Communicating to the organization the importance of meeting customer as well as statutory and regulatory requirements;
b) Establishing the quality policy,
c) Ensuring that quality objectives are established,
d) Conducting management reviews; and
e) Ensuring the availability of resources.

Needs and expectations of interested parties
Management responsibility – Guidelines
General guidance

Top management should establish policies and strategic objectives consistent with the purpose of the organization. Leadership, commitment and the involvement of the top management are essential for developing and maintaining an effective and efficient quality management system to achieve benefits for all interested parties. The key to achieving benefits for interested parties is to sustain and increase customer satisfaction. The deployment of the policies and implementation of plans to achieve the objectives are the responsibility of management. Management should involve everyone in the organization in these actions. Top management responsibilities include

- setting policies and objectives and leading the organization,
- provision of organization structure and resources,
- maintenance of current performance, and
- achievement of continual improvement.

Top management should define an approach for measurement of the organization's performance in order to verify that strategic objectives are achieved. This approach could include

- financial measures,
- measures of process performance, and
- assessment of satisfaction level of customers and other interested parties.

This performance information should be used as input to management review in order to ensure that continual improvement is the driver for organizational development.

Issues to be Considered

Issues to consider when developing, implementing and managing the organization's quality management system include the use of the quality management principles outlined in 4.3.

Based on these principles, the following activities should be considered:

- promoting policies and objectives to increase awareness, motivation and involvement of people, identifying realization processes which add value for the organization,
- planning for the future of the organization and management of change,

- setting and communicating directions related to achieving satisfaction of interested parties.

The quality management system should be appropriate for the organization's size and structure. It should be focused on the achievement of the organization's quality objectives.Top management should consider its approach to performance improvement through both continual improvement and radical change. It should consider the resources and communication needed to ensure that the quality management system is maintained and developed as the organization structure changes.

Top management should identify the organization's rea1ization processes, as these are directly related to the success of the organization. Top management should also identify those support processes that affect the efficiency of the realization processes or the needs of other interested parties.

To ensure all processes operate as an efficient network, the organization should analyze how all the processes interact. Consideration should be given

- To ensuring that the sequence and interaction of processes are designed to achieve the desired results,
- To ensuring inputs, activities and outputs are dearly defined and controlled,
- To managing risks and opportunities.
- To monitoring inputs and outputs to verify that individual processes are linked and operate effectively and efficiently. and
- To establishing data analysis that facilitates continual improvement across ail processes.

It is useful to define a process owner with full responsibility and authority to manage each process, and to achieve process objectives.

ISO 9001:2000 – Quality Management – Requirements

Customer focus

Top management shall ensure that customer requirements are determined and are met with the aim of enhancing customer satisfaction (see 7.2.1 and 8.2.1)

NOTE When determining customer needs and expectations, it is important to consider obligations related to product, including regulatory and legal requirements.

General

Every organization has several categories of interested parties, each with needs and expectations.

For quality management purposes, interested parties include

- customers and end users
- people in the organization,
- owners/investors, including shareholders, individuals or groups, including the public sector, that have a specific interest in the organization.
- suppliers and partners, and
- society in terms of the community and the public affected by the organization.

T o meet the needs and expectations of all interested parties, organizations should consider

- identification of the needs and expectations of all interested parties.
- maintenance of a balanced response to interested parties needs and expectations,
- translation of those needs and expectations into requirements,
- communication of those requirements to all levels of the organization, and
- improvement of all processes to create value for the interested parties.

Needs and Expectations

The success of the organization depends on understanding and satisfying current and future needs and expectations of customers (including end-users), and other interested parties. The management should endeavor to exceed the expectations of all interested parties.

Examples of product concerns from customers and end-users include

- conformance,
- dependability,
- availability,
- delivery,
- post-realization activities, and
- price and life-cycle costs.

To define customer and end-user needs and expectations, an organization should

- identify its customers, including potential customers,
- determine key product characteristics for the customers and end-users,
- identify and assess competition in its market,
- identify opportunities, weaknesses and future competitive advantages.

The organization should also identify people's needs and expectations for recognition, work satisfaction, competencies and development of knowledge. Such attention helps to ensure that the involvement and motivation of people are as strong as possible. The organization should also define financial and other results which satisfy the identified needs and expectations of owners and investors. Management should consider the potential benefits of establishing partnerships with suppliers to the organization, in order to create value for both parties. A partnership should be based on the definition of a joint strategy, sharing knowledge, risks and profits.

When establishing partnerships, an organization should

- identify key suppliers, contractors and distributors as potential partners,
- jointly establish a clear understanding of customers' needs and expectations,
- jointly establish a clear understanding of the partners' needs and expectations, and
- set goals to secure opportunities for continuing partnerships.

In considering its relationships with society, the organization should .demonstrate responsibility for health and safety,

- consider environmental impact, including conservation of energy and natural resources,
- identify applicable statutory and regulatory requirements,
- identify the current and potential impacts on society in general, and the local community in particular, of its products, processes and activities, and
- define the needs and actions for improvement in these areas

Statutory and Regulatory Requirements

Management should ensure that the organization has knowledge of the statutory and regulatory requirements that apply to its products, processes and activities.

The response to relevant statutory and regulatory requirements should not prohibit the organization from meeting its quality objectives.

Consideration should also be given to

- benefits to interested parties from exceeding compliance,
- the role of the organization in the protection of community interests, and
- the promotion of ethical interpretation and effective compliance with current and prospective requirements.

ISO 9001:2000 – Quality Management Systems -Requirements
Quality policy

Top management shall ensure that the quality policy:

a) is appropriate to the purpose of the organization;
b) includes a commitment to comply with requirements and continually improve the effectiveness of the quality management system,
c) provides a framework for establishing and reviewing quality objectives;
d) is communicated and understood within the organization, and
e) is reviewed for continuing suitability.

Quality policy

An organization's quality policy should be consistent witl1 the organization's overall business policies.

In establishing the quality policy, top management should consider

- the expected level of customer satisfaction,
- the needs of other interested parties,
- opportunities and needs for continual improvement.
- resources needed, and
- contributions of suppliers and partners.

An effectively formulated and communicated quality policy should

- be consistent witl1 a vision of the organization's future,
- make quality objectives understood throughout the organization.
- demonstrate top management commitment to quality and the provision of adequate resources for its achievement,
- promote a commitment to quality at all levels of the organization, with clear leadership by top management, and
- address continual improvement and customer satisfaction.

The quality policy should be periodically reviewed and revised as necessary.

ISO 9001:2000 – Quality Management Systems -Requirements
Planning Quality objectives

Top management shall ensure that quality objectives, including those needed to meet requirements for product are established at relevant functions and levels within the organization. The quality objectives shall be measurable and consistent with the quality policy.

Planning Quality objectives

The organization's objectives should be established during the planning process. They should be consistent with the quality policy and capable of being measured. When establishing these objectives,

management should consider the current and future needs of the organization and the markets served. Consideration should also be given to output from management reviews, current product and process performance, and to the levels of satisfaction of all interested parties. Objectives should be deployed throughout the organization with defined responsibility for their achievement and be clearly communicated to all relevant people. People should be able to translate these objectives into their individual contributions.

1SO 9001:2000 -Quality Management Systems -Requirements
Quality Management System Planning

Top management shall ensure that

a) The planning of the quality management system is carried out in order to meet the requirements given in 4.1, as well as the quality objectives, and
b) The integrity of the quality management system is maintained when changes to the quality management system are planned and implemented.

Quality Management System Planning

Management should implement quality planning for the activities and resources needed to satisfy the quality policy, objectives and requirements. Quality planning is an integral part of the quality management system.

Primary inputs for quality planning include

- needs and expectations of the customers and other interested parties,
- performance of the products,
- performance of the quality management system processes,
- lessons learned from previous experiences- .opportunities for improvement, and
- risk assessment and mitigation.

1S0 9001:2000 - Quality Management Systems -Requirements
Responsibility, Authority and Communication
Responsibility and Authority

Top management shall ensure that responsibilities and authorities are defined and communicated within the organization.

Management Representative

Top management shall appoint a member of management who, irrespective of other responsibilities, shall have responsibility and authority that includes.

a) Ensuring that processes needed for the quality management system are established, implemented and maintained.
b) Reporting to top management on the performance of the quality management system and any need for improvement, and
c) Ensuring the promotion of awareness of customer requirements throughout the organization.

NOTE The responsibility of a management representative can include liaison with external parties on maters relating to the quality management system.

Responsibility, Authority and Communication
General
Management should define and implement a quality management system in order to provide confidence that the organization can satisfy the needs and expectations of interested parties. The quality management system should be consistent with the organization's size, culture and products.
Outputs of quality planning can also identify

- the responsibility and authority for execution of improvement plans,
- the skills and knowledge needed,
- improvement approaches, methodology and tools, .the resources needed,
- alternative planning needs,
- indicators for performance achievement, and
- the need for documentation and records.

Quality planning outputs should be reviewed regularly (as changes in the organization's situation occur} and revised as necessary. To develop the quality management system, the management should address

- strategic objectives,
- quality policy and quality objectives,
- needs and expectations of interested parties,
- relevant statutory and regulatory requirements, .process approach,
- communication,
- structure of the organization and the environment in which it exists,
- resources,
- other management systems,
- improvement.

Top management should define and communicate responsibility and authority in order to implement and maintain the quality management system effectively and efficiently.
All people should be given authority and responsibilities to enable them to assist in the achievement of the quality objectives. This assignment of authority and responsibility helps to establish involvement and commitment of people throughout the organization.

Management Representative

Management representative(s) should be appointed and given authority by top management to manage, monitor, evaluate and coordinate the quality management system processes. The goal of the appointment is to enhance effective and efficient operation of the quality management system.
The representative(s) should report to top management and communicate with customers and other interested parties on matters pertaining to the quality management system.

ISO 9001:2000 - Quality Management Systems -Requirements
Internal communication

Top management shall ensure that appropriate communication processes are established within the organization and that communication takes place regarding the effectiveness of the quality management system.

Internal COMMUNICATION

Management should define and implement processes for the communication of quality requirements, objectives and accomplishments. Providing this information becomes a resource for improvement and the involvement of people in achieving quality objectives.
Examples of tools for communication include

- team briefings and other meetings,
- notice-boards, in-house journals/magazines,
- audio-visual and electronic media.

ISO 9001:2000 - Quality Management Systems - Requirements
Management Review
General

Top management shall review the organization's quality management system, at planned intervals, to ensure its continuing suitability, adequacy and effectiveness. This review shall include assessing opportunities for improvement and the need for changes to the quality management system, including the quality policy and quality objectives. Records from management reviews shall be maintained

Review Input
The input to management review shall include information on

a) Results of audits;
b) Customer feedback;
c) Process performance and product conformity;
d) Status of preventive and corrective actions;
e) Follow-up actions from previous management reviews;
f) Changes that could affect the quality management system, and
g) Recommendations for improvement.

Review Input
Management Review

General and Review Input

Top management should establish a process to review the quality management system at periodic intervals to evaluate its effectiveness and efficiency and verify that quality policy and objectives are being satisfied. In addition, the management review process should analyze current activities that may require change and consider opportunities for improvement of the quality management system.
Inputs for tile management review should include

- results from audits of the quality management system including internal, customer and third party audits,
- measurements of satisfaction of the needs and expectations of interested parties,
- performance of processes,
- analysis of product conformance,
- status of corrective and preventive actions,
- status of action items from previous reviews, and
- changes in original assumptions (for example, those arising from new technologies, outputs of research and development, quality concepts, financial, social, environmental conditions and relevant statutory and regulatory changes).

Additional inputs to consider include

- status and results of improvement activities,
- results of self-assessment of the organization,
- customer satisfaction measurements,
- market place evaluation, including the performance of competitors,
- results of benchmarking activities,
- performance of suppliers,
- opportunities for improvement

- status of partnership initiatives,
- financial effects of quality related activities,
- impact of changes to relevant statutory and regulatory requirements.

ISO 9001:2000 - Quality Management Systems - Requirements
Review Output

The outputs from the management review shall include any decisions and actions related to:

a) Improvement of the effectiveness of the quality management system and its processes;
b) Improvement of product related to customer requirements; and
c) Resource needs.
Results of management reviews shall be recorded.]

Review Output

Management review activity should be set in a context of the organization's strategic planning cycle. This placement helps to ensure quality objectives and requirements are integral to the organization’s overall objectives and requirements.
Results of management review should, for example, focus on

- adding value for interested parties,
- improved performance of products and processes,
- suitability of organizational structure and resources,
- ability to introduce new product on time in the market,
- managing risks.
- compliance with relevant statutory and regulatory requirements, and
- planning for future resources.

Observations, recommendations, conclusions and decisions for actions should be recorded to facilitate monitoring of progress, and used as input to subsequent reviews.
The management review process should be evaluated for effectiveness and improved when necessary.

Lesson # 24

ISO 9001(2000) QMS (CLAUSE # 6) RESOURCES MANAGEMENT

6. Resource Management

ISO 9001:2000 – Quality Management Systems -Requirements

6. Resource Management

6.1 Provision of Resources

The organization shall determine and provide the resources needed

a) To implement and maintain the quality management system and continually improve its effectiveness, and
b) To enhance customer satisfaction by meeting customer requirement.

6.1 General Guidance

6.1.1 Introduction

Resources essential to the implementation and achievement of the organization's strategies and objectives for the quality management system should be identified and made available. These may include people, suppliers, information, infrastructure, work environment and financial resources.

Issues to be Considered

Consideration should be given to

- efficient and timely provision of resources in relation to opportunities and constraints,
- tangible resources such as realization and support facilities,
- intangible resources such as intellectual property,
- resources and mechanisms to encourage innovative continual improvement,
- organization structures, including project and matrix management needs,
- information management,
- enhancement of competence via training, education, and learning,
- use of natural resources and the impact of resources on the environment, and
- planning for future resources.

ISO 9001:2000 - Quality Management Systems - Requirements

6.2 Human Resources

6.2.1 General

Personnel performing work affecting product quality shall be competent on the basis of appropriate education training, skills and experience.

6.2 Human Resources

Involvement of People

In order to achieve its objectives and to stimulate innovation, an organization should encourage the involvement of its people through

- identifying competence needs for each process activity,
- selection, ongoing training, and career planning,
- defining responsibilities and authorities,
- establishing individual and team objectives, managing performance and evaluating results, facilitating involvement in objective setting and decision making,
- encouraging recognition and reward,

- facilitating open, two-way communication by continually reviewing the needs of its people, creating conditions to encourage innovation,
- ensuring effective teamwork,
- using information technology to facilitate communication of suggestions and opinions,
- using measurements of people satisfaction for improvement, and
- invest
- targeting the reasons why people are leaving the organization.

Subcontracting or temporary employment of people should be considered to ensure that the objectives of the organization are achieved.

ISO 9001:2000 - Quality Management Systems - Requirements
6.2.2 Competence, Awareness and Training

The organization shall:

a) Determine the necessary competence for personnel performing work affecting product quality,
b) Provide training or take other actions to satisfy these needs,
c) Evaluate the effectiveness of the actions taken,
d) Ensure that its personnel are aware of the relevance and importance of their activities and how they contribute to the achievement of the quality objectives, and
e) Maintain appropriate records of education, training, skills and experience (see 4.2.4).

6.2.2 Competence, Awareness and Training
6.2.2.1 Competence

The organization should identify the competence needed for each, activity that affects its performance, should assess the competence of its people to perform the activities, and develop plans to close any gaps. The identification should be based on an analysis of present and expected needs of the organization compared with the existing competence of its people.
Input for competence related needs may come from a variety of internal and external sources, such as

- future demands related to strategic and operational plans and objectives,
- evaluation of the competence of individual people to perform defined activities, and
- Legislation, Regulation, Standards, and directives affecting the organization. its activities and its resources.

6.2.2.2 Training and Awareness

The organization should analyze the development needs of all its people and design training plans for them. This is to provide people with knowledge which, together with skills and experience, leads to competence. The organization should provide training to its people in order to achieve its objectives. The training should emphasize the importance of meeting requirements and the needs of customers and other interested parties. It should also include the awareness of consequences to the organization and its people of failing to meet tile requirements.
Enhancement of competence via training, education and reaming involves

- technical knowledge and skills,
- management skills and tools,
- social skills, .knowledge of markets and customer needs and expectations,
- relevant statutory and regulatory requirements,
- internal and appropriate external standards, and
- documentation for performing the work.

To increase the awareness and involvement of people, the training should cover

- the vision for the future of the organization,
- the organization's policies and objectives,
- organizational change and development,
- the initiation and implementation of improvement activities,
- creativity and innovation,
- organization's impact on society,
- introductory programs for new people, and
- periodic refresher programs for people already trained.

Training plans should include .training objectives,

- training programs and methodologies,
- training resources needed,
- identification of necessary support ,
- evaluation of training in terms of enhanced competence of people,
- measurement of the effectiveness of training and the impact on the organization.

Organizations should consider providing personal development training for their people, in organizational development training provided.

ISO 9001:2000 – Quality Management Systems - Requirements
6.3 Infrastructure

The organization shall determine, provide and maintain the infrastructure needed to achieve conformity to product requirements. Infrastructure includes, as applicable

a) building workspace and associated utilities;
b) process equipment (both hardware and software), and
c) supporting services (such as transport or communication).

6.3 Infrastructure

Infrastructure provides the foundation for operations. Depending on the organization's products, the infrastructure may include plant, workspace, hardware, software, tools and equipment, support services, communication, transport and facilities.
The organization should:

a) define and provide an infrastructure in terms such as objectives, function, performance, availability, cost, safety. security and renewal;
b) develop and implement a maintenance approach, to ensure that the infrastructure continues to meet operational needs; this approach should consider the type and frequency of maintenance and verification of operation of each infrastructure element, based on its criticality and usage;
c) evaluate the infrastructure against the needs and expectations of ail interested parties;
d) consider environmental issues associated with infrastructure, such as conservation, pollution, waste and recycling.

Natural phenomena that cannot be controlled may impact the infrastructure. The plan for the infrastructure should consider associated risks and include strategies to maintain the quality of products.

ISO 9001:2000 - Quality Management Systems - Requirements
6.4 Work Environment

The organization shall determine and manage the work environment needed to achieve conformity to product requirements.

6.4 Work Environment

The work environment of an organization is a combination of human and physical factors. These factors influence motivation, satisfaction and performance of people, potentially enhancing the performance of the organization.
Examples of human factors affecting the work environment include

- creative work methodologies and opportunities for greater involvement to realize the potential of ail people,
- safety rules and guidance, including use of protective equipment, .ergonomics,
- special facilities for people in the organization.

Examples of physical factors affecting the work environment include

• heat	• hygiene	• vibration
• noise	• humidity	• pollution
• light	• cleanliness	• air flow

6.5 Information

Information is a fundamental resource for the continual development of an organization's knowledge base and can stimulate innovation. Information is also essential for making factual decisions.
To manage information effectively, the organization should:

- identify its information needs,
- identify internal and external sources of information.
- provide timely access to adequate infon"l1ation,
- use infon"l1ation to meet its strategies and objectives.
- ensure appropriate security and confidentiality.

The managing of information should be evaluated for its effectiveness and efficiency, and improvements should be implemented.

6.6 Suppliers and Partnerships

Organizations can benefit from establishing relationships with suppliers and partners to promote and facilitate clear and open communication and to improve the processes that create value.

There are various opportunities for organizations to increase value through working with their suppliers and partners such as

- optimizing the number of suppliers and partners.
- establishing two-way communication at the most appropriate level in both organizations to facilitate rapid solution of problems, and to avoid costly delays or disputes.
- cooperation with suppliers in validation of the capability of their processes, .monitoring of supplier ability to deliver confon"l1ing products,
- encouraging suppliers to implement continual improvement programmes and to participate in joint improvement initiatives,
- involving suppliers in the organization's design and/or development activities to share knowledge and improve the realization and delivery of conforming products,
- involving partners in identification of purchasing needs and joint strategy development, evaluating, recognizing and rewarding efforts achieved by suppliers and partners.

6.7 Natural resources

Consideration should be given to the natural resources that can influence the performance of the organization. While such resources are often out of the direct control of the organization, they can have significant positive or negative effects on its results. The organization should have plans, or contingency plans, to ensure the availability of these resources and to prevent or minimize negative effects.

6.8 Financial Resources

Resource management should include activities for determining the needs for, and sources of, financial resources. The control of financial resources should include activities for comparing actual usage against plans, and taking necessary action. Management should plan, make available and control the financial resources necessary to implement and maintain the quality management system and achieve the organization's objectives. Management should also consider the development of innovative financial approaches to support and encourage improvement.

The effectiveness and efficiency of the quality management system can influence the financial results of the organization. For example:

a) Internally, through process and product failures, or waste in material and time;
b) Externally, through product failures, costs of compensation of guarantees and warranties, costs of lost customers and markets.

Reporting of such matters may provide a means of determining ineffective or inefficient activities, and initiating improvement actions.

The financial reporting of activities related to the performance of the quality management system and product quality should be used in management reviews.

Lesson # 25

ISO 9001(2000) (CLAUSE # 7) PRODUCT REALIZATION AND CUSTOMER RELATED PROCESSES

7 Product Realization

ISO 9001:2000 – Quality Management Systems - Requirements

7.1 Planning of Product Realization

The organization shall plan and develop the processes needed for product realization. Planning of product realization shall be consistent with the requirements of the other processes of the quality management system

In planning product realization, the organization shall determine the following, as appropriate:

a) Quality objectives and requirements for the product;
b) The need to establish processes, documents, and provide resources specific to the product;
c) Required verification, validation, monitoring, inspection and test activities specific to the product and the criteria for product acceptance;
d) Records needed to provide evidence that the realization processes and resulting product meet requirements

The output of this planning shall be in a form suitable for the organization's method of operations.

NOTE 1 A document specifying the processes of the quality management system (including the product realization processes) and the resource to be applied to a specific product, project or contract, can be referred to as a quality plan.
NOTE 2 The organization may also apply the requirements given in 7.3 to the development of product realization processes.

General Guidance

The definition of quality requirements relates to how an activity is to be performed, while quality objectives are measured by process output or achievement. This lends itself to the recognition of any organization as a collection of processes and activities. The interdependence of processes can be complex, resulting in a network. To ensure all processes operate as an efficient system, the organization should undertake an analysis of how processes interrelate. The analysis should recognize that the output of one process is often the input to another.

The principles of process management should be applied to all activities. The basic concept for a process consists of three elements: inputs, activities and outputs.

Realization processes result in the products of the organization that add value to the organization. Support processes, including management processes, are necessary to the organization, but do not directly add value. Realization and support processes can include networks of sub-processes.

Issues to be Considered

A process can be represented as a flow of activities. This concept can help to define inputs, specify resources and actions and achieve desired outputs. Results from validation of processes and verification of outputs should also be considered as inputs for a process, to achieve continual improvement and promotion of excellence throughout the organization. Improvement of the processes will improve the quality management system and the organization. Annex B describes a process improvement methodology to assist in recognizing activities as a process flow, and achieve continual improvement of processes.

Documentation related to processes should support

- identification and communication of significant features of the processes.
- training in the operation of processes,
- sharing knowledge and experience in teams and work groups, .measurement and audit of processes, and
- analysis, review and improvement of processes.

The role of people within processes should be evaluated in order

- to ensure the health and safety of people,
- to ensure that the necessary skills exist,
- to support. networks of processes,
- to provide for input of people in process analysis, and
- to promote innovation from people.

The drive for continual improvement should focus on process improvement as the means by which beneficial results are achieved. Increased benefits, improved customer satisfaction and reduction of waste are examples of measurable results achieved by greater effectiveness and efficiency of processes.

7.1 Managing Processes

General

The organization should identify processes needed to realize products to satisfy the requirements of customers and other interested parties. To ensure product realization, consideration should be given to desired outputs, process steps, activities, flows, control measures, training needs, equipment, methodologies, information, materials and other resources.
A plan should be defined to manage the processes including

- input and output requirements such as specifications and resources,
- activities within the processes,
- validation of the processes,
- verification of products,
- analysis of the process including operability and maintainability,
- risk assessment and mitigation, .corrective action,
- opportunities for improvement, and .control of change.

Internal production and service operations also exist as support processes and sub-processes and should be considered in order to achieve improved interested-party satisfaction.
Examples of internal operations include

- managing information, .training of people,
- machining of components for assembly,
- availability of spare and replacement parts,
- realization of product for service.

7.1 Planning for Process Inputs, Outputs and Review

Process inputs should be defined and recorded in order to provide a basis for the fom1ulation of requirements to be used for verification and validation of outputs. Inputs can be internal or external to the organization.

Input requirements critical to the product or process should be identified in order to assign appropriate responsibilities and resources.
Resolution of ambiguous or conflicting input requirements can involve consultation with affected internal and external parties. Input derived from activities not yet fully evaluated should be subject to evaluation through subsequent review, verification and validation.
The organization should identify significant or critical features of products and processes in order to develop a plan for control and monitoring of the activities within the process.

Examples of issues to consider include:

- competence of people, .documentation,
- equipment capability and monitoring,
- health, safety and work environment.

Process outputs should be verified against input requirements and compliance with acceptance criteria in order to satisfy customer and other interested party requirements. For verification purposes, the outputs should be documented and evaluated against input requirements and acceptance criteria. This evaluation should identify necessary corrective actions, preventive actions or potential improvements in the efficiency of the process. Verification of the product can be carried out during operations in order to identify process variation.
The organization should undertake a periodic review of process performance to ensure the process is consistent with the operating plan.

Examples of issues for consideration include:

- reliability and repetitiveness of the process,
- identification of and prevention against potential nonconformance,
- adequacy of design and/or development inputs,
- adequacy of design and/or development outputs,
- consistency of inputs and outputs with planned objectives,
- potential for improvements, and
- unresolved issues.

7.1 Planning for Process Validation and Changes

Validation of products should ensure they meet the needs and expectations of customers and satisfy other interested parties. Validation activities can include modeling, simulation and trials, and reviews involving customers or other interested parties.

Issues to be considered should include

- quality policy and objectives,
- qualification of equipment.
- operating conditions for the product,
- use or application of the product.
- disposal of the product,
- product life-cycle,
- environmental impact of the product, and
- impact of the use of natural resources including materials and energy.

Validation should be carried out at appropriate intervals to ensure timely reaction to changes impacting the process.
Particular attention should given to validation of processes

- for high-value products,
- where deficiency in product will only be apparent in use, and
- which cannot be repeated,
- where verification of product is not possible.

The organization should implement a process for the control of changes to ensure that changes benefit the organization and satisfy the needs and expectations of interested parties. Changes should be identified, recorded, evaluated, reviewed and controlled, depending on the effect on other processes and the needs and expectations of customers and other interested parties.
Any changes in the process affecting product characteristics should be recorded and communicated in order to maintain the integrity of the product and provide information for improvement. Authority for initiating change should be defined in order to maintain control.
A product or process should be verified after any related change to ensure that the instituted change had the r' desired effect.
Use of simulation techniques can be considered in order to plan for the prevention of failures in processes.
Risk assessment should be undertaken to assess the potential for, and the effect of, possible failures in processes. The results should be used to define and implement preventive actions to mitigate identified risks.

Examples of tools for risk assessment include:

- process failure mode and effects analysis,
- fault tree analysis.
- reliability assessment.

ISO 9001:2000 - Quality Management Systems - Requirements
7.2 Customer-Related Processes
7.2.1 Determination of Requirements Related to the Product

The organization shall determine
a) Requirements specified by the customer, including the requirements for delivery and post-delivery activities,
b) Requirements not stated by the customer but necessary for specified or intended use, where known,
c) Statutory and regulatory requirements related to the product, and
d) Additional requirements determined by the organization,

7.2.2 Review of Product Requirements

The organization shall review the requirements related to the product. This review shall be conducted prior to the organization’s commitment to supply a product to the customer (e.g. submission of tenders, acceptance of contracts or orders, acceptance of changes to contracts or orders) and shall ensure that:

a) Product requirements are defined;
b) Contract or order requirements differing from those previously expressed are resolved, and
d) The organization has the ability to meet defined requirements.

Records of the results review and actions arising from the review shall be maintained
Where the customer provides no documented statement of requirement, the customer requirements, shall be confirmed by the organization before acceptance.

Where the customer provides no documented statement of requirement, the customer requirements shall be confirmed by the organization before acceptance. Where product requirements are changed, the organization shall ensure that relevant documents are amended and that relevant personnel are made aware of the changed requirements.

NOTE: In some situations, such as internet sales, a formal review is impractical for each order. Instead the review can cover relevant product information such as catalogues or advertising material.

7.2.3 Customer Communication

The organization shall determine and implement effective arrangements for communicating with customers in relation to

a) Product information;
b) Enquiries, contracts or order handling, including amendments, and
c) Customer feedback, including customer complaints.

7.2 Processes Related to Interested Parties

The organization should define, implement and maintain processes to ensure adequate understanding of the needs and expectations of interested parties. These processes should include identification and review of relevant information and could actively involve customers and other interested parties. Examples of information sources include results from

- Processes or activities specified by the customer or other interested parties.
- Market research,
- Contract requirements.
- Competitor analysis, .benchmarking, and
- Processes due to statutory or regulatory requirements.

The organization should have a full understanding of the process requirements of the customer, or other interested party, before initiating action to comply. This understanding and its impact should be mutually acceptable to the participants.

ISO 9001:2000 - Quality Management Systems –Requirements

7.3.1 Design and Development Planning

The organization shall plan and control design and development of product. During the design and development planning, the organization shall determine

a) The design and development stages;
b) The review, verification and validation that are appropriate to each design and development stage, and
c) The responsibilities and authorities for design and development.

The organization shall manage the interfaces between different groups involved in design and development to ensure effective communication and clear assignment of responsibility.

Planning output shall be updated, as appropriate, as the design and development progresses

7.3 Design and/or Development

General Guidance

When designing and/or developing products or processes, the organization should consider life cycle, safety, dependability, durability, maintainability, ergonomics, the environment, disposal, and other risks. The organization should ensure that the needs of all interested parties can be satisfied.

Risk assessment should be undertaken to assess the potential for, and the effect of, possible failures in products or processes. The results should be used to define and implement preventive actions to mitigate identified risks. Examples of tools for risk assessment of design and/or development include

- design failure mode and effects analysis-
- fault tree analysis
- reliability assessment,
- relationship diagrams,
- ranking techniques, and
- simulation techniques.

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7.3.2 Design and Development Inputs

Inputs relating to product requirements shall be determined and records maintained .These inputs shall include

a) Functional and performance requirements;
b) Applicable statutory and regulatory requirements;
c) Where applicable, information derived from previous similar designs, and
d) Other requirements essential for design and development.

These inputs shall be reviewed for adequacy. Requirements shall be complete, unambiguous and not in conflict with each other.

7.3.2 Design and/or Development Guidance

The organization should identify process inputs that impact product design and/or development to satisfy the needs and expectations of interested parties.

Examples include;

a) Internal inputs such as
   - Policies, standards and specifications,
   - Skill requirements,
   - Dependability requirements,
   - Documentation and data on existing products, and
   - Outputs from other processes;
b) External inputs such as
   - Customer or marketplace needs and expectations,
   - Contractual requirements and interested party specifications,
   - Relevant statutory and regulatory requirements,
   - International or national standards, and
   - Industry codes of practice;
c) Other inputs that identify those characteristics of the product or process that are crucial to its safe and proper functioning, such as
   - Operation, installation and application,
   - Storage, handling, maintenance and delivery,
   - Physical parameters and environment, and
   - Disposal requirements.

It should be noted that in the design and development of software and service products, inputs on end-user requirements, as well as direct customer requirements, could be particularly important. Such inputs should be formulated in such a way that the product can be tested effectively through subsequent verification and validation.
Design and/or development output should lead to realization of the product and also include information necessary to satisfy the needs and expectations of customers and other interested parties.
Examples of the output of design and/or development activities include

- product specifications,
- training requirements,
- methodologies,
- purchase requirements, and
- acceptance criteria.

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7.3.3 Design and/or Development Outputs

The outputs of the design and development shall be provided in a form that enables verification against the design and development input and shall be approved prior to release

Design and development outputs shall:

a) Meet the input requirements for design and development;
b) Provide appropriate information for purchasing, production and for service provision,
d) Contain or reference product acceptance criteria, and
e) Specify the characteristics of the product that are essential for its safe and proper use.

7.3.3 Design and Development Outputs

The organization should conduct periodic reviews to consider design and/or development objectives, including

- meeting verification and validation goals,
- evaluation of potential hazards or modes of failure in product use,
- life-cycle data on performance of the product, and
- potential impact of the product on the environment.

The organization should undertake reviews of design and/or development outputs, as well as the process, in order to satisfy the needs and expectations of interested parties. It should be verified that the outputs meet the design specifications and validated that they meet the needs of the customer. Sufficient data should be generated through verification and validation activities to enable design and/or development methodologies and decisions to be reviewed. The review of methodologies should include process and product improvement, failure investigation, activities, and future design and/or development process needs. Partial validation of the design and/or development outputs may be necessary to provide confidence in their future application. by means such as:

- Validation of engineering designs prior to construction.
- Installation or application, .validation of software outputs prior to installation or use.
- Validation of direct customer services prior to widespread introduction.

Examples of verification activities include:

- comparative methodologies, such as alternative design and/or development calculations,

- evaluation against similar products,
- testing, simulations or trials to check compliance with specific input requirements.

1S0 9001:2000 - Quality Management Systems – Requirements
7.3.4 Design and Development Review

At suitable stages, systematic reviews of design and development shall be performed in accordance with planned arrangement
a) To evaluate the ability of the results of design and development to meet requirements, and
b) To identify any problems and propose necessary actions.

Participants in such reviews shall include representatives of functions concerned with the design and development stage(s) being reviewed. Records of the results of the reviews and any necessary actions shall be maintained

7.3.5 Design and development verification

Verification shall be performed in accordance with planned arrangements to ensure that the design and development outputs have met the design and development input requirements. Records of the results of the verification and any necessary actions shall be maintained

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7.3.6 Design and Development Validation

Design and development validation shall be performed in accordance with planned arrangements sure that the resulting product is capable of meeting the requirements for the specified application or intended use, where known. Wherever practicable, validation shall be completed prior to the delivery or implementation of the product. Records of the results of validation and any necessary actions shall be maintained

7.3.7 Control of design and development changes

Design and development changes shall be identified and records maintained. The changes shall be reviewed, verified and validated, as appropriate, and approved before implementation. The review of design and development changes shall include evaluation of the effect of the changes on constituent parts and product already delivered. Records of the results of the review of changes and any necessary actions shall be maintained.

7.4 Purchasing
1S0 9001:2000 - Quality Management Systems - Requirements
7.4 Purchasing
7.4.1 Purchasing Process

The organization shall ensure that purchased product conforms to specified purchase requirements. The type and extend of control applied to the supplier and the purchased product shall be dependent upon the effect of the purchased product on subsequent product realization or the final product.

The organization shall evaluate and select suppliers based on their ability to supply product in accordance with the organization's requirements. Criteria for selection evaluation and re-evaluation shall be established. Records of the results of evaluations and any necessary actions arising from the evaluation shall be maintained

7.4.1 Purchasing Process

The organization should identify and implement purchasing process for selection, evaluation, and control of purchased products to ensure they satisfy its needs, total cost of purchased product to ensure they satisfy its needs and requirements, as well as those of interested parties.
Purchasing processes should include

- identification of needs,
- total cost of purchased product, taking account of performance, price and delivery,
- inquiries, quotations and tendering,
- verification of purchased products,
- selection of suppliers, including those with unique processes,
- purchase documentation,
- contract administration.
- nonconforming purchased products.
- supplier control and supplier development, and
- assessment of risks associated with the purchased product.

Process requirements and specifications should be developed with suppliers in order to benefit from available specialist knowledge. Suppliers could also be involved in the specification of quality management system requirements in relation to their products

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7.4.2 Purchasing Information

Purchasing information shall describe the product to be purchased, including where appropriate

a) Requirements for approval of product, procedures, processes and equipment,
b) Requirements for qualification of personnel, and
c) Quality management system requirements.

The organization shall ensure the adequacy of specified purchase requirements prior to their communication to the supplier.

7.4.2 Suppliers

The organization should establish processes to identify potential suppliers or to develop existing suppliers and evaluate their ability to supply the required products. These processes may include

- evaluation of relevant experience.
- review of product quality.
- price, delivery performance and response to problems.
- audits of supplier management systems and evaluation of their potential capability to provide the required products efficiently and within schedule
- checking references for customer satisfaction,
- financial assessment to assure the viability of the supplier throughout the intended period of supply,
- service and support capability.
- logistic capability including locations and resources.

The organization should ensure that orders for purchased product are adequate to satisfy the input requirements of the organization's processes.

Examples of issues to be considered include

- purchasing from qualified suppliers,
- logistic requirements,
- product identification,
- preservation of product,
- traceability of product,
- documentation and records,
- communication,
- acceptance criteria, and
- right of access to supplier's premises.

The organization should establish a process for verification of purchased products to ensure compliance with specification. The level of verification activity can vary according to the nature or the type of product and historical performance of the supplier.
The organization should define the need for records of purchased product verification, supplier communication and response to nonconformities in order to demonstrate its conformance to specification.

ISO 9001:2000 - Quality Management Systems -Requirements
7.4.3 Verification of Purchased Product

The organization shall establish and implement the inspection or other activities necessary for ensuring that purchased product meets specified purchase requirements.

Where the organization or its customer intends to perform verification at the supplier’s premises, the organization shall state the intended verification arrangements and method of product release in the purchasing information.

Lesson # 26

ISO 9001(2000) QMS (CLAUSE # 7) CONTROL OF PRODUCTION AND SERVICES

7.5 Production and Service Operations
ISO 9001:2000 - Quality Management Systems - Requirements
7.5 Production and Service Operations
7.5.1 Control of Production and Service Provision

The organization shall plan and carry out production and service provision under controlled conditions. Controlled conditions shall include, as applicable.

a) The availability of information that the characteristics of the product;
b) The availability of work instructions, as necessary,
c) The use of suitable equipment,
d) The availability and use of monitoring and measuring devices,
e) The implementation of monitoring and measurement, and
f) The implementation of release, delivery and post-delivery activities.

7.5.1 Control of Production and Service Provision

The organization should identify requirements for operations that realize products or deliver services in order to ensure compliance with specifications and satisfy the needs and expectations of interested parties. To meet these needs and expectations, the organization should review its

- ability to comply with contractual requirements,
- training and competence of people,
- communication.
- problem prevention, and
- relevant statutory and regulatory requirements.

Further considerations may include .capacity planning,

- logistics.
- intended use,
- post- realization activities.
- preservation.
- training required, A
- product flow and yield.
- automation, and
- electronic monitoring.

The infrastructure should be appropriately maintained and adequately protected in and between use in order to maintain operational capability.

ISO 9001:2000-Quality Management Systems -Requirements

7.5.2 Validation of Processes for Production and Service Provision

The organization shall validate any processes for production and service provision where the resulting output cannot be verified by subsequent monitoring or measurement. This includes any processes where deficiencies become apparent only after the product is in use or the service has been delivered. Validation shall demonstrate the ability of these processes to achieve planned results.
The organization shall establish arrangement for these processes including, as applicable

a) Defined criteria for review and approval of the processes,
b) Approval of equipment and qualification of personnel,
c) Use of specific methods and procedures,
d) Requirements for records (see 4.2.4), and
e) Revalidation.

ISO 9001:2000- Quality Management Systems -Requirements
7.5.3 Identification and Traceability

Where appropriate, the organization shall identify the product by suitable means throughout product realization. To organization shall identify the product status respect to monitoring and measurement requirements. Where traceability is a requirement, the organization shall control and record the unique identification of the product

NOTE in some industry sectors, configuration management is a means by which identification and traceability are maintained.

7.5.3 Identification and Traceability

The organization should establish a process and documentation for identification and traceability for control of products to satisfy customer and other interested party requirements.
The need for identification and traceability may be due to

- status of products, including component parts,
- contract requirements,
- relevant statutory and regulatory requirements,
- intended use or application
- hazardous materials, and
- risk mitigation.

ISO 9001:2000- Quality Management Systems -Requirements
7.5.4 Customer Property

The organization shall exercise care with customer property while it is under the organization's control or being used by the organization. The organization shall identify, verify, protect and safeguard customer property provided for use or incorporation into the product. If any customer property is lost, damaged or otherwise found to be unsuitable for use, this shall be reported to the customer and records maintained

NOTE Customer property can include intellectual property.

7.5.4 Customer Property

The organization should identify responsibilities in relation to property and other assets owned by customers and other interested parties and under the control of the organization, in order to protect the value of the property. Examples of such property are:

- ingredients or components supplied for inclusion in a product,
- product supplied for repair, maintenance or upgrading,
- packaging materials supplied directly by the customer,
- customer materials handled by service operations such as storage,
- services supplied on behalf of the customer such as transport of customer property to a third party,
- protection of customer intellectual property including specifications, such as drawings.

ISO 9001:2000 - Quality Management Systems - Requirements
7.5.5 Preservation of Product

The organization shall preserve conformity of product during internal processing and delivery to the intended destination. This preservation shall include identification, handling, packaging, storage and protection. Preservation shall also apply to the constituent parts of a product.

7.5.5 Preservation of Product

The organization should define and implement processes for handling, packaging, storage, preservation and delivery that are designed to prevent damage, deterioration or misuse during internal processing and final delivery of the product. The organization should consider the need for any special requirements arising from the nature of the product. Special requirements may be associated with software, electronic media, hazardous materials, specialist personnel, and products or materials which are unique or irreplaceable. The organization should identify resources needed to maintain the product throughout its life cycle to prevent damage, deterioration, or misuse. The organization should communicate information to the interested parties involved about the resources needed to facilitate preservation actions.

ISO 9001:2000 - Quality Management Systems – Requirements
7.6 Control of Monitoring and Measuring Devices

The organization shall determine the monitoring and measurement to be undertaken and the monitoring and measuring devices needed to provide evidence of conformity of product to determined requirements The organization shall establish processes to ensure that monitoring and measurement can be carried out and are carried out in a manner that is consistent with the monitoring and measurement requirements.

Where necessary to ensure valid results, measuring equipment shall

a) Be calibrated or verified at specified intervals, or prior to use, against measurement standards traceable to international or national measurement standards; where no such standards exist, the basis used for calibration or verification shall be recorded;
b) Be adjusted or re-adjusted as necessary;
c) Be identified to enable the calibration status to be determined;
d) Be safeguarded from adjustments that would invalidate the measurement result;
e) Be protected from damage and deterioration during handling, maintenance and storage.

In addition, the organization shall assess and record the validity of the previous measuring results when the equipment is found not to conform to requirements. The organization shall take appropriate action on the equipment and any product affected. Records of the results of calibration and verification shall be maintained.
When used in the monitoring and measurement of specified requirements, the ability of computer software to satisfy the intended application shall be confirmed. This shall be undertaken prior to initial use and reconfirmed as necessary.

7.6 Control of Measuring and Monitoring Devices

The organization should define and implement methodologies for verification of products and validation of processes to ensure interested party satisfaction. These methodologies could include surveys, simulations, measurement and monitoring.
Measuring and monitoring devices can be used for the verification of outputs of processes against specified requirements. The organization should ensure that where measuring and monitoring devices are used fur verification, they are calibrated and maintained to accepted standards, giving confidence to the results.

The organization should consider other means to eliminate all potential errors from processes (known as “fool-proofing”), for verification of process outputs to minimize the need for control of measurement and monitoring devices, and to add value for interested parties.

Lesson # 27

ISO 9001(2000) QMS (CLAUSE # 8) MEASUREMENT, ANALYSIS, AND IMPROVEMENT

8. Measurement, Analysis and Improvement
ISO 9001:2000 - Quality Management Systems - Requirements
8. Measurement, Analysis and Improvement
8.1 General

The organization shall plan and implement the monitoring, measurement, analysis and improvement processes needed
a) To demonstrate conformity of the product,
b) To ensure conformity of the quality management system, and
c) To continually improve the effectiveness of the quality management system.
This shall include determination of applicable methods, including statistical techniques, and the extent of their use.

8.1 General Guidance
Introduction

An organization should provide for the measurement and evaluation of its product, the capability of processes, customer satisfaction and items required by other interested parties at appropriate intervals. This includes the recording, collecting, analyzing, summarizing and communication of relevant data needed to monitor and improve the organization's performance.
Measurements should be evaluated in terms of the added value provided to the organization, and should be deployed only where the benefit can be identified. The measurement criteria and objectives should be identified. These measurements should lead to consideration of appropriate action. They should not be purely for the accumulation of information.
The results of measurement can show a level of achievement, but consideration should also be given to trends and variation. The causes of trends and variation should be identified in order to ensure they are understood. The organization should determine the need for the use of statistical techniques for analyzing data, including verifying process operations and product characteristics. Statistical techniques selected for use should be suitable for the application. The organization should control and monitor the use of the statistical techniques selected.
The results of analysis of data from improvement activities should be one of the inputs to the management review process. The information and data collected should be used throughout the organization to support effective and efficient management.
The organization should promote the use of creative and innovative approaches for improvement processes. Also, the organization should plan the implementation of the improvement action and provide adequate resources. The organization should continually monitor and record the implementation of improvement actions, which will also provide data for future improvements. Relevant comparative data and information should be used to set realistic and challenging goals.

Continual improvement requires change within the organization. Evaluation of change requires measurement. Measurement itself does not initiate change. Measurements should be taken for a clearly defined purpose.

Issues to be Considered

Measurement, analysis and improvement include issues such as the following:

a) Measurement, analysis and improvement should be used to establish appropriate priorities for the organization;
b) The measurements employed by the organization should be reviewed periodically, and data should be verified on a continuum (basis for accuracy and completeness;

c) The benchmarking of individual processes as well as customer satisfaction should be employed as .an improvement tool;
d) The use of measurements and the generation of information are essential for good communication and they should be the basis for improvement and involvement of all interested parties; such information should be current, and be clearly defined as to its purpose;
e) Appropriate tools for the communication of information resulting from the analyses of the measurements should be implemented;
f) The effectiveness of communication to interested par1ies should be measured to determine whether the information is clearly understood;
g) Self-assessment should be considered on a periodic basis to assess organizational performance and to define improvement Opportunities (see annex A).

ISO 9001:2000 - Quality Management Systems - Requirements
8.2 Monitoring and Measurement
8.2.1 Customer Satisfaction

As one of the measurements of the performance of the quality management system, the organization shall monitor information relating to customer perception as to whether the organization has met customer requirements. The methods for obtaining and using this information shall be determined.

8.2 Measurement and Monitoring
8.2.1 Measurement and Monitoring of System Performance
General

The organization should identify the methodologies needed for identification of areas for improvement in the overall efficiency and effectiveness of the quality management system. Examples of measurement and monitoring methodologies include customer satisfaction measurement,

- Internals audits,
- Financial measurements, and
- Self-assessment methodologies.

8.2.1 Measurement and Monitoring of Customer Satisfaction

The organization should recognize that there are many sources of customer-related information, arid should establish processes to gather analyze and deploy this information. The organization should identify sources of customer and end-user information available in written and verbal forms, from internal and external sources. Examples of customer- related information include

- Feedback on all aspects of product.
- Customer requirements and contract information, .marl<et needs.
- Service delivery data, and
- Information relating to competition.

The organization's process for requesting, measuring and monitoring feedback of customer satisfaction and dissatisfaction should provide information on a continual basis. It should address conformance to requirements, meeting needs and expectations of customers, as well as price and delivery of product.
The organization should establish and use sources of customer information and should cooperate with its customers in order to anticipate future needs. The organization should plan and establish processes for implementing appropriate marketing activities to efficiently obtain the “voice of the customer”.
The organization should specify the methodology and the measures to be used and the frequency of gathering and analyzing data for review.

The organization should plan data collection methodologies. Examples of sources of information on customer satisfaction include

- Customer complaints,
- Direct communication with customers.
- questionnaires and surveys, .focus groups,
- Reports from consumer organizations,
- Reports in various media, and .sector studies.

ISO 9001:2000 - Quality Management Systems - Requirements
8.2.2 Internal Audit

The organization shall conduct internal audits at planned intervals to determine whether the quality management system:

a) Conforms to the planned arrangements (see 7.1) to the requirements of this Internal Standards and to the quality management system requirements established by the organization, and
b) Is effectively implemented and maintained

An audit program shall be planned, taking into consideration the status and importance of the processes and areas to be audited, as well as the results of previous audits. The audit criteria, scope, frequency and methods shall be defined. Selection of auditors and conduct of audits shall ensure objectivity and impartiality of the audit process. Auditors shall not audit their own work.
The responsibilities and requirements for planning and conducting audits, and for reporting results and maintaining records shall be defined in a documented procedure.
The management responsible for the area being audited shall ensure that actions are taken without under delay to eliminate detected nonconformities and their causes. Follow-up activities shall include the verification of the actions taken and the reporting of verification results (see 8.5.2)

8.2.2 Internal Audit

An organization should establish an internal audit process to assess the strengths and weaknesses of the Quality Management system. The internal audit process may also review the efficiency and effectiveness of other activities and support processes in the organization. The internal audit process should include the planning, implementation, reporting and follow-up activities related to internal audits. Planning for internal audits should be flexible in order to permit changes in emphasis based on findings and observations obtained during the audit Input from the area to be audited, as well as from other interested parties, should be considered in the development of internal audit plans.
Examples for consideration by internal auditing include

- existence of adequate documentation,
- effective implementation of processes,
- identification of nonconformance,
- documentation of results, .competence of people,
- opportunities for improvement,
- capability of processes,
- use of statistical techniques,
- use of information technology,
- analysis of quality cost data,
- assigned responsibilities and authorities,
- performance results and expectations,
- adequacy and accuracy of performance measurement,
- improvement activities, and
- relationships with interested parties, including internal customers.

In addition to documenting non-conformances, internal audit reporting could also indicate areas for improvement (with recommendations), as well as areas of outstanding performance.
Examples of follow-up activities include

- Verification of implementation.
- timeliness and effectiveness of corrective action, and
- Effectiveness of the internal audit process.

8.2.2 Self Assessment

Organizations should consider establishing and implementing a self-assessment process. The range and depth d the assessment should be planned in relation to the organization's objectives and priorities. The self-assessment methodology described in annex A, as well as existing quality awards criteria or other appropriate methodologies may be used for self-assessment of the organization. Some of the advantages of using the self-assessment methodology given in annex A are that .it is simple to understand,

- it is easy to use,
- it has minimal impact on the use of management resources, and
- it provides input to enhance the performance of the organization's Quality management system.

The self-assessment methodology described in annex A focuses on determining the degree of efficiency and effectiveness of implementation of the Quality management system defined in this International Standard. Annex A is not intended to provide a self-assessment methodology to compete with existing models. Self-assessment methodology should not be considered as an alternative to internal or external quality auditing. Use of the methodology described in annex A can provide an overall view of the performance of the organization and the degree of maturity of the quality management system. It can also provide input for identifying areas in the organization requiring improvement and can help to determine priorities.

8.2.3 Measurement and Monitoring of Processes

The organization should identify measurement methodologies and perform measurements to evaluate process performance. The organization should consider how these measurements can be incorporated into the product realization process and the role of measurement in process management.
Examples of measures of process performance include .accuracy,

- timeliness,
- dependability ,
- reaction time of processes and people to special internal and external requests.
- cycle time or throughput,
- effectiveness and efficiency of people,
- utilization of technologies, and
- cost reduction.

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8.2.3 Monitoring and Measurement of Processes

The organization shall apply suitable methods for measurement and, where applicable, measurement of the quality management system processes. These methods shall demonstrate the ability of the processes to achieve planned results. When planned results are not achieved, correction and corrective action shall be taken, as appropriate, to ensure conformity of the product

8.2.4 Monitoring and Measurement of Products

The organization should establish and specify the measurement requirements (including acceptance criteria) for its products. The measurement of product should be planned and performed to verify conformance to specified requirements.

The organization should consider the following when choosing a methodology to measure products:

a) The conformance to specified requirements of its products, and those provided by suppliers;
b) The location of each measurement point in its process sequence;
c) Characteristics to be measured at each point, the documentation and acceptance criteria to be used;
d) Equipment and tools required;
e) Customer established points for witness or verification of selected characteristics of a product;
f) Inspections or testing that are required to be witnessed or performed by statutory and regulatory authorities;
g) Where, when and how the organization intends, or is required by the customer or statutory and regulatory authorities, to engage qualified third parties to perform
   - type testing.
   - In-process inspections or testing,
   - Product verification,
   - Product validation;
h) Qualification of material, product, process, people or the quality management system;
i) Final inspections to confirm that all specified inspections and testing are completed and accepted;
j) Outputs of the measurement process of the product.

The measurement of product should be performed prior to delivery to verify that the product is in conformance with requirements. The organization should review the approach used for measuring products and the records of verification and make appropriate improvement.
Typical examples of product measurement records include

- inspection and test reports,
- material release notices,
- certificates as required, and
- electronic data.

ISO 9001:2000 -Quality Management Systems - Requirements
8.2.4 Monitoring and Measurement of Product

The organization shall monitor and measure the characteristics of the product to verify that requirements have been met. This shall be carried out at appropriate stages of the product realization process in accordance with the planned arrangement (see 7.1).
Evidence of conformity with the acceptance criteria shall be maintained. Records shall indicate the person(s) authorizing release of product.
Product release and service delivery shall not proceed until the planned arrangements (see 7.1) have been satisfactorily completed, unless otherwise approved by a relevant authority and, where applicable, by the customer.

8.2.4 Measurement and Monitoring of Satisfaction of Interested Parties

The organization should identify the measurement information required to meet the needs of other interested parties at appropriate stages of product realization. Such information should include measurements relating to people, owners, suppliers and society.

8.2.4 People in the Organization

The organization should

- gather the opinion of its people regarding the manner in which the organization satisfies their needs and expectations, and

- assess individual and collective performances and their contribution to organizational results.

8.2.4 Owners

The organization should

- assess its capacity to attain the defined goals,
- measure financial performance,
- measure the impact of external factors on results, and
- identify the value contributed by the actions taken.

8.2.4 Suppliers

The organization should

- monitor the performance of suppliers and their compliance with the purchasing policy,
- measure or monitor the quality of the product purchased, and
- measure the performance of the purchasing processes of the organization.

8.2.4 Society

The organization should

- define appropriate measurements relative to its objectives, for interaction with society, and
- periodically assess the efficiency of its actions and the perceptions of the results by relevant parts of society.

8.3 Control of Nonconformance

General

All people within the organization should have the authority to report non-conformances at any stage of a process. This is particularly true for those people engaged in monitoring processes and process output verification. Prompt attention to non-conformances permits the initiation of prompt corrective action.
Authority for reaction to non-conformances should be defined to maintain achievement of product requirements. The organization should control product identification, segregation and disposition in order to prevent misuse. The organization may also need to consider recording information on those non-conformances which are corrected in the normal course of work. Such data can provide valuable information for process improvement It is essential that all non-conformances be recorded, together with their disposition, to assist learning and provide data for analysis and improvement activities.

8.3 Nonconformance Review and Disposition

The organization should have a process to provide for review and disposition of all non-conformances. Review of non conformances should be conducted by designated persons to determine if any trends or patterns of occurrence exist. These trends should be considered for improvement and as input to management review. People carrying out the review should be competent to evaluate the effects of the non-conformance and should have the authority and resource to define corrective action. Customer acceptance of the disposition may be a contractual requirement.

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8.3 Control of Nonconforming Product

The organization shall ensure that product which does not conform to product requirements is identified and controlled to prevent unintended use or delivery. The controls and related responsibilities and authorities for neither dealing with nor conforming product shall be defined in a documented procedure.

The organization shall deal with nonconforming product by one or more of the following ways:

a) By taking action to eliminate the detected nonconformity;
b) By authorizing its use, release or acceptance under concession by a relevant authority and, where applicable, by the customer;
c) By taking action to preclude its original intended use or application.

Records of the nature of nonconformities and any subsequent actions taken, including concessions obtained, shall be maintained (see 4.2.4)

When nonconforming product is corrected it shall be subject to re-verification to demonstrate conformity to the requirements. When nonconforming product is detected after delivery or use has started, the organization shall take action appropriate to the effects, or potential effects, of the nonconformity.

- operational performance
- customer satisfaction and dissatisfaction,
- satisfaction level of other interested parties,
- effectiveness and efficiency of - organization,
- supplier contribution,
- economics of quality and financial and market-related performance and,
- bend1marrking of performance.

8.4 Analysis of Data for Improvement

The organization should analyze data from various sources to assess performance against plans and goals and to identify areas for improvement. The organization should plan to use statistical methodologies for data analysis, which can help in assessing, controlling, and improving performance of processes.

The analysis of data can help deten11ine the cause of problems, and therefore guide effective corrective and preventive action. This may require analysis of the product specifications, as well as analysis of relevant processes, operations and quality records.

Information and data from all parts of the organization should be integrated and analyzed to evaluate the overall performance of the organization. The overall performance should be presented in a forma that is suitable to different levels of management.

The results of analysis can be used to deten11ine

- trends,
- operational performance
- customer satisfaction and dissatisfaction,
- satisfaction level of other interested parties,
- effectiveness and efficiency of - organization,
- supplier contribution,
- economics of quality and financial and market-related performance and,
- bend marking of performance.

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8.4 Analysis of Data

The organization shall determine collect and analyze appropriate data to demonstrate the suitability and effectiveness of the quality management system and to evaluate where continual improvement of the effectiveness of the quality management system can be made. This shall include data generated as a result of monitoring and measurement and from other relevant sources.

The organization shall analyze this data to provide information on:

a) Customer satisfaction (see 8.2.1)
b) Conformity to product requirements (see 7.2.1)

c} characteristics and trends of processes and products including opportunities for preventive action,
d) Suppliers

ISO 9001:2000- Quality Management Systems - Requirements
8.5 Improvement
8.5.1 Continual Improvement

The organization shall continually improve the effectiveness of the quality management system through the use of the quality policy, quality objectives, audit results, analysis of data, corrective and preventive actions and management review.

8.5 Improvement
8.5.1 General

The organization should continually seek to improve its processes, rather than wait for a problem to reveal opportunities for improvement. Potential improvements can range from continual activities to long-term improvement projects. The organization should have a process in place to identify and manage improvement projects.
The efficiency and effectiveness of processes should be emphasized when actions are taken. These actions should be monitored to ensure that desired goals are met. Identification of causes of deviations may result in changes to, the product, processes and even revision of the quality management system.

8.5.2 Corrective Action

The organization should plan and establish a process for corrective action. Corrective action planning should include evaluation of the significance of problems affecting quality. The evaluation should be in terms of the potential impact on such aspects as operating costs, costs of nonconformance, performance, dependability, safety and customer satisfaction. Appropriate functions should be represented in the corrective action process.
The organization should identify sources of information, collect information and define the necessary corrective - actions. The defined corrective action should be focused on eliminating causes of non-conformances and defects in order to avoid recurrence.
Examples of sources of information include

- customer complaints,
- non-conformance reports,
- outputs from management review,
- internal audit reports,
- outputs from data analysis,
- relevant quality management system records,
- outputs from satisfaction measurements,
- process measurements, and .results of self-assessment

The corrective action process should include

- a definition of the causes of non-conformances and defects,
- elimination of causes of non-conformances and defects,
- appropriate actions to avoid recurrence of problems, and
- a record of the activity and results.

Efficiency and effectiveness of processes should be emphasized when actions are taken and the actions should be monitored to ensure that desired goals are met.
Corrective actions should be considered for inclusion in the management review process. For example, corrective actions with high financial impact or those that have significant potential impact on customer satisfaction should be considered.

Root because analysis results should be verified by testing, where appropriate, in order to define effective corrective action.

ISO 9001:2000 -Quality Management Systems -Requirements
8.5.2 Corrective Action

The organization shall take corrective action to eliminate the cause of nonconformities in order to prevent recurrence. Corrective action shall be appropriate to the effects of the nonconformities encountered.
The documented procedure shall be established to define requirement for

a) Reviewing nonconformities (including customer complaints);
b) Determining the causes of nonconformities;
c) Evaluating the need for actions to ensure that nonconformities do not recur;
d) Determining and implementing the corrective action needed;
e) Recording results of action taken;
f) Reviewing of corrective action taken.

8.5.3 Preventive Action

The organization should use preventive methodologies to identify the causes of potential non-conformances. Examples of such methodologies include risk analyses, .trend analyses, statistical process control, fault tree analysis, failure modes and effects and criticality analyses.

Appropriate organizational representatives should participate in the preventive actions.
The organization should identify sources of information for planning and prioritizing preventive actions. Examples of sources are

- customer needs and expectations,
- market analysis,
- management review output,
- outputs from data analysis,
- satisfaction measurements,
- process measurements,
- systems that consolidate many sources of customer information,
- relevant quality management system records,
- results of self-assessment, and
- processes that provide early warning of approaching out-of-control operating conditions.

Preventive actions should be considered for inclusion in the management review process. This is especially true for preventive actions with high financial impact or those that have significant potential impact on satisfaction of customers and other interested parties.

ISO 9001:2000-Quality Management Systems -Requirements
8.5.3 Preventive Action

The organization shall determine preventive action to eliminate the causes of potential nonconformities in order to prevent occurrence. Preventive actions shall be appropriate to the effects of the potential problems. A documented procedure shall be established to define requirements for:

a) Determining potential nonconformities and their causes;
b) Evaluating the need for action to prevent occurrence of nonconformities
c) Determining and implementing action needed,
d) Records of results of action taken and
e) Reviewing preventive action taken.

8.5.4 Process for Improvement

In addition to the improvement actions described in the previous sub-clauses, the organization should define and implement a methodology for process improvement that can be applied to all processes and activities. Such a standard methodology for process improvement can become a tool for improving internal effectiveness and efficiency, as well as improving the satisfaction of customers and other interested parties.
Examples of inputs to the improvement process include

- validation data,
- test data,
- requirements and feedback from interested parties,
- financial data,
- product performance data, and
- service delivery data.

The organization should undertake small step improvement activities integral to routine operations in order to maintain continual improvement through involvement of people. Improvement should also be planned for breakthrough projects to achieve specific objectives.

Lesson # 28

QUALITY IN SOFTWARE SECTOR AND MATURITY LEVELS

Performance Maturity Levels

The performance maturity levels used by organizations are as follows:

Maturity	Performance level	Guidance
1	No formal approach	No systematic approach evident, no results, poor results or unpredictable results.
2	Reactive approach	Problem- or prevention-based systematic approach; minimum data on improvement results available.
3	Stable formal system approach	Systematic process-based approach, early stage of systematic improvements; data available on conformance to objectives and existence of improvement trends.
4	Continual improvement emphasized	Improvement process in use; good results and emphasized sustained improvement trends.
5	Best-in-class performance	Strongly integrated improvement process; best-in-class bench marked results demonstrated

Software Engineering Institute's Capability Maturity Model (CMMI) is also a generic model of quality improvement and is focused on processes and systems related to IT/Software sector.

Capability Maturity Model (**CMM**) broadly refers to a process improvement approach that is based on a process model. CMM also refers specifically to the first such model, developed by the Software Engineering Institute (SEI) in the mid-1980s, as well as the family of process models that followed. A process model is a structured collection of practices that describe the characteristics of effective processes; the practices included are those proven by experience to be effective.

The Capability Maturity Model can be used to assess an organization against a scale of five process maturity levels. Each level ranks the organization according to its standardization of processes in the subject area being assessed. The subject areas can be as diverse as software engineering, systems engineering, project management, risk management, system acquisition, information technology (IT) services and personnel management.

The **Capability Maturity Model** (**CMM**) is a way to develop and refine an organization's processes. The first CMM was for the purpose of developing and refining software development processes. A maturity model is a structured collection of elements that describe characteristics of effective processes. A maturity model provides:

- a place to start
- the benefit of a community's prior experiences
- a common language and a shared vision
- a framework for prioritizing actions
- a way to define what improvement means for your organization

A maturity model can be used as a benchmark for assessing different organizations for equivalent comparison. It describes the maturity of the company based upon the project the company is dealing with and the clients.

Structure of CMM

Maturity Levels A layered framework providing a progression to the discipline needed to engage in continuous improvement (It is important to state here that an organization develops the ability to assess the impact of a new practice, technology, or tool on their activity. Hence it is not a matter of adopting these; rather it is a matter of determining how innovative efforts influence existing practices. This really empowers projects, teams, and organizations by giving them the foundation to support reasoned choice.)

Key Process Areas Key process area (KPA) identifies a cluster of related activities that, when performed collectively, achieve a set of goals considered important.

Goals The goals of a key process area summarize the states that must exist for that key process area to have been implemented in an effective and lasting way. The extent to which the goals have been accomplished is an indicator of how much capability the organization has established at that maturity level. The goals signify the scope, boundaries, and intent of each key process area.

Common Features Common features include practices that implement and institutionalize a key process area. These five types of common features include: Commitment to Perform, Ability to Perform, Activities Performed, Measurement and Analysis, and Verifying Implementation.

Key Practices The key practices describe the elements of infrastructure and practice that contribute most effectively to the implementation and institutionalization of the key process areas.

Levels of the CMM

There are five levels of the CMM. According to the SEI,

Level 1 - Initial

At maturity level 1, processes are usually ad hoc and the organization usually does not provide a stable environment. Success in these organizations depends on the competence and heroics of the people in the organization and not on the use of proven processes. In spite of this ad hoc, chaotic environment, maturity level 1 organizations often produce products and services that work; however, they frequently exceed the budget and schedule of their projects.

Maturity level 1 organizations are characterized by a tendency to over commit, abandon processes in the time of crisis, and not be able to repeat their past successes again.
Level 1 software project success depends on having high quality people.

Level 2 – Repeatable

At maturity level 2, software development successes are repeatable. The processes may not repeat for all the projects in the organization. The organization may use some basic project management to track cost and schedule.

Process discipline helps ensure that existing practices are retained during times of stress. When these practices are in place, projects are performed and managed according to their documented plans.

Project status and the delivery of services are visible to management at defined points (for example, at major milestones and at the completion of major tasks).

Basic project management processes are established to track cost, schedule, and functionality. The minimum process discipline is in place to repeat earlier successes on projects with similar applications and scope. There is still a significant risk of exceeding cost and time estimates.

Level 3 – Defined

The organization's set of standard processes, which is the basis for level 3, is established and improved over time. These standard processes are used to establish consistency across the organization. Projects establish their defined processes by the organization's set of standard processes according to tailoring guidelines.

The organization's management establishes process objectives based on the organization's set of standard processes and ensures that these objectives are appropriately addressed.

A critical distinction between level 2 and level 3 is the scope of standards, process descriptions, and procedures. At level 2, the standards, process descriptions, and procedures may be quite different in each specific instance of the process (for example, on a particular project). At level 3, the standards, process descriptions, and procedures for a project are tailored from the organization's set of standard processes to suit a particular project or organizational unit.

Level 4 - Managed

Using precise measurements, management can effectively control the software development effort. In particular, management can identify ways to adjust and adapt the process to particular projects without measurable losses of quality or deviations from specifications. Organizations at this level set quantitative quality goals for both software process and software maintenance.

Sub processes are selected that significantly contribute to overall process performance. These selected sub processes are controlled using statistical and other quantitative techniques.

A critical distinction between maturity level 3 and maturity level 4 is the predictability of process performance. At maturity level 4, the performance of processes is controlled using statistical and other quantitative techniques, and is quantitatively predictable. At maturity level 3, processes are only qualitatively predictable.

Level 5 - Optimizing

Maturity level 5 focuses on continually improving process performance through both incremental and innovative technological improvements. Quantitative process-improvement objectives for the organization are established, continually revised to reflect changing business objectives, and used as criteria in managing process improvement. The effects of deployed process improvements are measured and evaluated against the quantitative process-improvement objectives. Both the defined processes and the organization's set of standard processes are targets of measurable improvement activities.

Process improvements to address common causes of process variation and measurably improve the organization's processes are identified, evaluated, and deployed. Optimizing processes that are nimble, adaptable and innovative depends on the participation of an empowered workforce aligned with the business values and objectives of the organization. The organization's ability to rapidly respond to changes and opportunities is enhanced by finding ways to accelerate and share learning.

A critical distinction between maturity level 4 and maturity level 5 is the type of process variation addressed. At maturity level 4, processes are concerned with addressing special causes of process variation and providing statistical predictability of the results. Though processes may produce predictable results, the results may be insufficient to achieve the established objectives. At maturity level 5, processes are concerned with addressing common causes of process variation and changing the process (that is, shifting the mean of the process performance) to improve process performance (while maintaining statistical probability) to achieve the established quantitative process-improvement objectives.

Lesson # 29

INSTALLING AN ISO -9001 QM SYSTEM

ISO 9001's requirements for quality management systems are also generic in nature, and are applicable to organizations in any industry or economic sector. Whether the organization manufactures a product or provides a service, whether it is a company or a governmental agency, whether it is large or small, ISO 9000 can apply, and be used to advantage. To be registered the organization must go through a process that includes the following steps:

8. Develop (or upgrade) a quality manual that describes how the company will assure the quality of its products or services.
9. Document procedures (or upgrade existing documentation) that describe how the various processes for design, production, continual improvement, and so forth, will be operated. This must include procedures for management review/audits and the like.
10. The organization must provide evidence of top management's commitment to the QMS and its continual improvement.
11. The organization's top management must ensure that customer requirements are determined and met.
12. The organization must hire an accredited registrar company to examine its systems, processes, procedures, quality manual, and related items. If everything is in order, registration will be granted. Otherwise, the registrar will inform the company of which areas require work (but will not inform the company specifically what must be done), and a second visit will be scheduled.
13. Once registration is accomplished, the company will conduct its own internal audits to ensure that the systems, processes, and procedures are working as intended.
14. Also once registered, the outside registrar will make periodic audits for the same purpose. These audits must be passed to retain registration.

An important point to understand about ISO 9000 is that the organization has to respond to all ISO 9000 requirements and tell the registrar specifically what it is going to do and how. ISO does not tell or advise the organization. Assuming the registrar agrees with the organization's plan, registration is awarded. To retain that registration, the *organization must do what it said it would do.*

Implementation, Audit and Registration

The registration process includes document review by the registrar of the quality system documents or quality manual; pre-assessment, which identifies potential noncompliance in the quality system or in the documentation; assessment by a team of two or three auditors of the quality system and its documentation; and surveillance, or periodic re-audits to verify conformity with the practices and systems registered. During the assessment, auditors might ask such question as (using management responsibility as an example):

Does a documented policy on quality exist? Have job descriptions for people who manage or perform work affecting quality been documented? Are descriptions of functions that affect quality been documented? Are descriptions of functions that affect quality available? Has management designated a person or group with the authority to prevent nonconformities in products, identify and record quality problems, and recommend solutions? What means are used to verify the solutions?
Re-certification is required every three years. Individual sites – not entire companies – must achieve registration individually. All costs are borne by the applicant, so the process can be quite expensive.

Lesson # 30

CREATING BUSINESS EXCELLENCE

Before we look at excellence models, let us see why sometime these initiatives fail.
There are many reasons for Quality Programs failures, including the following:

- The efforts were too narrowly focused, as with statistical applications on the shop floor.
- The efforts were misfocused, limited to improving only "quality of work life" issues for employees rather than also addressing issues of strategic concern.
- The managers relied on traditional methods and assumptions, ad were not equipped with the right tools, techniques, and theory to improve quality.
- The managers were too focused on tools and techniques, and did not understand how to transform themselves, their employees, and the organization.
- The managers were too impatient, with a short-term focus, and unwilling to stay the course, overcome initial barriers, and wait for long-term gains.
- The managers never care for the culture change in organization.

Consider the following ten reasons why TQM "programs" do not work for many companies:

1. *TQM focuses people's attention on internal processes rather than on external results* An asset of TQM is that it gets managers to attend to internal processes. But taken to an extreme, managers can get too preoccupied with internal issues such as the controversial issue of performance measurement and ignore shifting perceptions and preferences of customers.
2. *TQM focuses on minimum standards.* Zero defects and no rework efficiency distract people form adding value and excitement to customers' lives.
3. *TQM develops its own cumbersome bureaucracy.* Organizational charts and reporting systems with interlocking committees, councils, and improvement teams imply a linear and predictable improvement process, rather than the chaotic and disruptive rebuilding that is often necessary.
4. *TQM delegates quality to quality "experts" rather than to "real" people.* Quality shouldn't be delegated, but lived in the strategy of the company and roles of the managers.
5. *TQM does not demand radical organizational reform.* Real quality improvement requires structural change (perhaps flattened structures), and liberation of people from stifling control systems and the tyranny of functionalism which precludes teamwork.
6. *TQM does not demand changes in management compensation.* If rewarded on short-term financial gains, managers will not be likely to attend t quality measures.
7. *TQM appeals to faddism, egotism, and quick-fixism.* Although they will not admit it, many managers have applied for awards, like the ISO, EQA, Baldrige, for reasons of personal aggrandizement and corporate public relations, or for quick and painless profitability. In reality, quality requires a never ending pursuit of improvement.
8. *TQM drains entrepreneurship and innovation from corporate culture.* Too much emphasis on standardization and routine precludes the constant shifting needed t keep up with external changes.
9. *TQM has no place for love and passion.* Though this comment seems a bit precious, it means that the analytical, detached, and sterile programs put in place to ensure quality are often devoid of the human emotion and soul that inspire attachment to the company by employees and to the products by customers

Certainly, no all TQM programs are characterized by all of these deficiencies. But many of the TQM failures suffer at least a few of these major problems. The underlying cause of all these TQM deficiencies is that managers failed to understand the concept of quality. Some managers define quality too narrowly as "meeting specifications." Others do not define quality at all, but rely on the claim, "I know it when I see it." We define quality too narrowly as "meeting specifications." Others do not define

quality at all, but rely on the claim, "I know it when I see it." We define quality as a principle that encourages excellence in everything: products, strategies, systems, processes, and people. As you will see, there are many ways that quality can be pursued and realized. Some of the specific approaches that help managers realize the general principle of excellence are presented below.

To inspire purposeful change for improvement, managers must have a clear understanding of quality. They must understand how it relates to their roles, and how it must be integrated and connected to the organization's strategy for providing value to customers. This integrated approach brings quality into the mainstream of managerial practice.

Psychologists suggest that individuals go through four stages of learning:

1. Unconscious in competence: You don't know that you don't know.
2. Conscious incompetence: You realize that you don't know.
3. Conscious competence: You learn to do, but with conscious effort.
4. Unconscious competence: Performance comes effortlessly.

Organizations seem to follow the same paradigm.

For organizations committed to pursuing total quality, change is a way of life. Organizational change is needed in implementing TQ and constantly there after. In the initial stage, an effort must be mounted to begin to change the culture of the organization. Unless a culture based on customer satisfaction, continuous improvement, and teamwork is established, TQ will belittle more than "just another one of management's programs." Indeed, this is often the cause of failure of TQ initiatives.
Once TQ is underway in an organization, continuous improvement efforts will relentlessly create changes in product designs, standard operating procedures, and virtually every other aspect of organizations. One important aspect of continuous improvement is reengineering, in which the processes by which the organization operates are reexamined and redesigned to provide higher quality at lower cost.

Elements of a Total Quality Culture

The organizational culture needed to support TQ is one that values customers, improvement, and teamwork. In an organization with a TQ-friendly culture, everyone believes that customers are the key to the organization's future and that their needed must come first. If two employees are having a conversation and a customer enters the shop, the conversation ends until the customer is served.

Employees in a quality –oriented culture instinctively act as a team. If someone is away from her desk and her phone rings, another employee will answer it rather than leave a customer hanging. Organizations where a focus on customers, continuous improvement, and teamwork are taken for granted have a good chance of succeeding at total quality. Most organizations do not have such a culture prior to exposure to TQ; some degree of cultural change is necessary.

These elements, along with several others, are reflected clearly in the Baldrige, EFMD and other National Quality Program Criteria for Performance Excellence. The criteria are built upon a set of "core values and concepts".

- Visionary leadership.
- Customer-driven excellence,
- Organizational and personal learning,
- Valuing employees and partners,
- Agility,
- Focus on the future,
- Managing for innovation,

- Management by fact,
- Public responsibility and citizenship.
- Focus on results and creating value, and systems perspective.

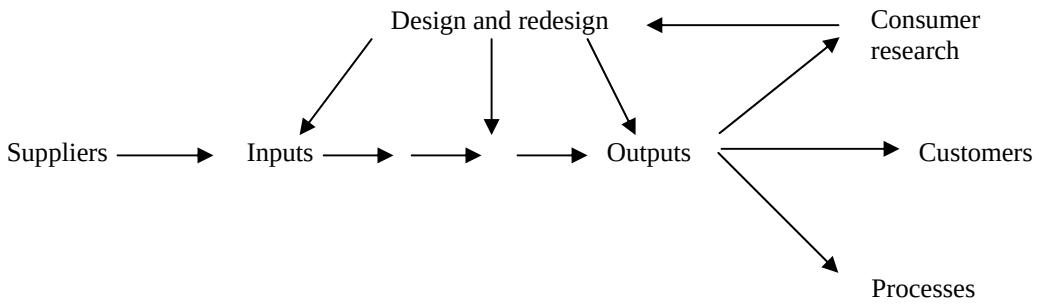
These values provide a good summary of the cultural elements necessary to sustain a total quality environment and are embedded in the beliefs and behaviors of high-performing organizations.

The existence of a set of cultural values necessary for successful TQ does not mean that all organization that wish to practice total quality must have the same culture. Many aspects of culture differ greatly from one quality oriented company to another. Company personnel may prefer to communicate in person or in writing; they may wear uniforms, gray flannel suits, or jeans. As long as they hold the core values of TQ, quality can find a home in their organization.

Lesson # 31

CREATING QUALITY AT STRATEGIC, TACTICAL AND OPERATIONAL LEVEL

In 1950 Deming drew the following picture on a blackboard for a handful of Japanese executives:



Many people see this as simply a diagram of a typical Production or Operation System that is linked to customers and suppliers. Visionaries in the practice of TQ see this as a new model of an organization chart from a strategic perspective.

The Functional Structure and Operations

In the functional structure, the organization is divided into functions such as operations, marketing, MIS and maintenance, each of which is headed by a manager. In such organizations communication occurs vertically up or down the chain of command, rather than horizontally across functions. Functional structures provide organizations with a clear chain of command and allow people to specialize in the aspect of the work for which they are best suited. They also make it easy to evaluate people based on a narrow but clear set of responsibilities. For these reasons functional structures are common in both manufacturing and service organizations at plant and business unit levels.

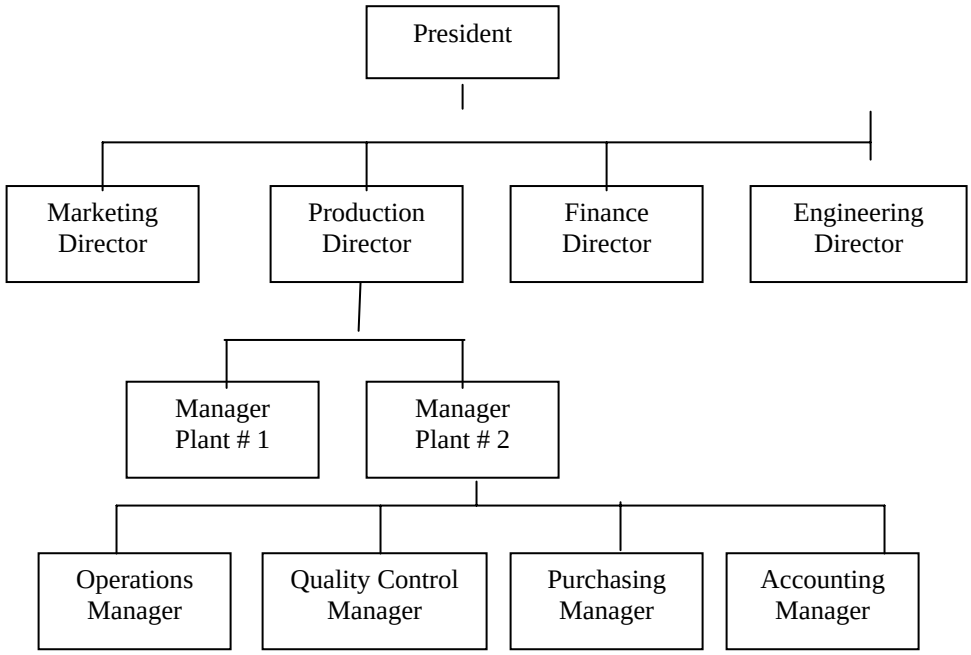
Problems with Functional Structure

Despite its popularity, the functional structure is designed primarily for the administrative convenience of the organization, rather than for providing high-quality service to customers. From a TQ point of view, the functional structure has several inadequacies.

The Functional Structure Separates Employees from Customers

Few employees in the functional organization have direct contact with customers or even a clear idea of how their work combines with the work of others to satisfy customers. The functional structure tends to insulate employees from learning about customer expectations and their degree of satisfaction with the service or product the firm is providing. Being insulated from customers encourages in workers a narrow conception of their responsibilities. This is often expressed in statements such as “It’s not my job” or “I just work here.” Even when such employees want to help customers, they often have such a limited understanding of how their organizational system works that they are unable to do so. This often results in demotivated workers and poor quality work.

Functional Structure for a Manufacturing Company



Most of us have experienced this phenomenon when we call a large organization trying to get help and get switched to several different people before (if we're lucky) finding someone willing and able to help us. If our needs as customers relate to the product or service as a whole, but the knowledge and responsibilities of anyone with whom we deal relate only to their function, we are doomed to disappointment.

The Functional Structure Inhibits Process Improvement

No organizational unit has control over a whole processes, although most processes involve a large number of functions. This is because the breakup of the organization into functions is usually unrelated to the processes used to deliver a product to the customer. This structure is likely to create complex, wasteful processes, as people do things in one area that must be redone or undone, in another.
For example, some organization maintain a group of engineers whose sole responsibility is to redesign products so that they can be manufactured effectively. The engineers who design the products in the first place worry only about product performance, not manufacturability. (For another example of problems in coordinating design and manufacturing.) Worse yet, if one function tries to improve its part, it may well make things worse (more wasted time and effort, more cost) for another part of the process. In this environment, continuous process improvement doesn't stand a chance. This arrangement obviously stands in the way of continuous process improvement. Organizations pursuing TQ often retain their quality assurance departments, but these units act more as coaches or facilitators to employees, rather than as the group with primary responsibility for quality. In summary, the functional organization compromises total quality in several ways: It distances people from customers and insulates them from customer expectations. It promotes complex and wasteful processes and inhibits process improvement. It separates the quality function from the rest of the organization, providing people with an excuse for not worrying about quality.

Redesigning Organizations for Quality

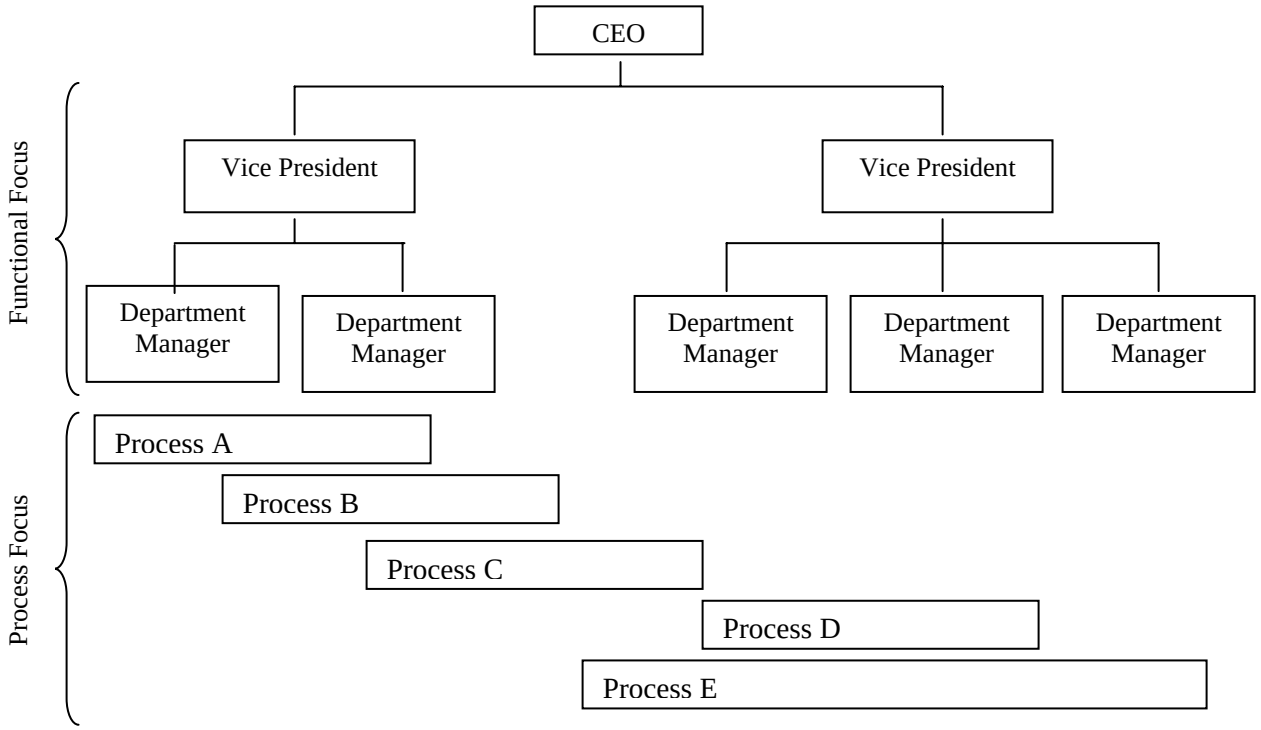
Poor organization design can be devastating to a company. One of Deming's 14 Points is to "break down barriers between departments" because "people in various departments must work as a team." This slogan captures in a nutshell what the TQ philosophy entails for organizational design. People cannot contribute to customer satisfaction and continuous improvement if they are confined to

functional prisons where they cannot see customers or hear their voices. Some of the more effective ways to break down these barriers are to focus on processes, recognize internal customers, create a team-based organization, reduce hierarchy, and use steering committees.

Focus on Processes

A process is how work creates value for customers. Common business process include acquiring customer and market knowledge, fulfilling customer orders, purchasing, developing new products or service, strategic planning, production or service delivery, distribution, research and development, information management, performance measurement, and training, to name just a few. Individuals or groups, known as process owners, are accountable for process performance and have the authority to manage and improve their process. Process owners may range from high-level executives who manage cross-functional processes to workers who run machinery on the shop floor. Assigning process owners ensures that someone is responsible to manage the process and optimize its effectiveness.

Process versus Function



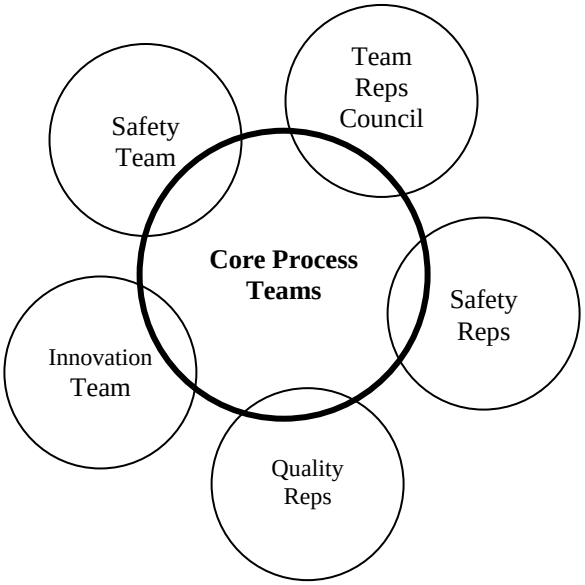
A process focus, as opposed to the functional structure, is shown below. Nearly every major activity within a business involves some form of cross-functional cooperation. A process perspective links all parts of an organization together and increases employee understanding of the entire system, rather than focusing on only a small part. In addition, it helps managers to recognize that problems arise from processes, not people. By aligning the structure of an organization with the actual work processes that the organization performs, customers may be served more effectively. Process management involves the design of processes to develop and deliver products and services that meet the needs of customers, daily control so that they perform as required, and their continual improvement.

Create a Team-Based Organization

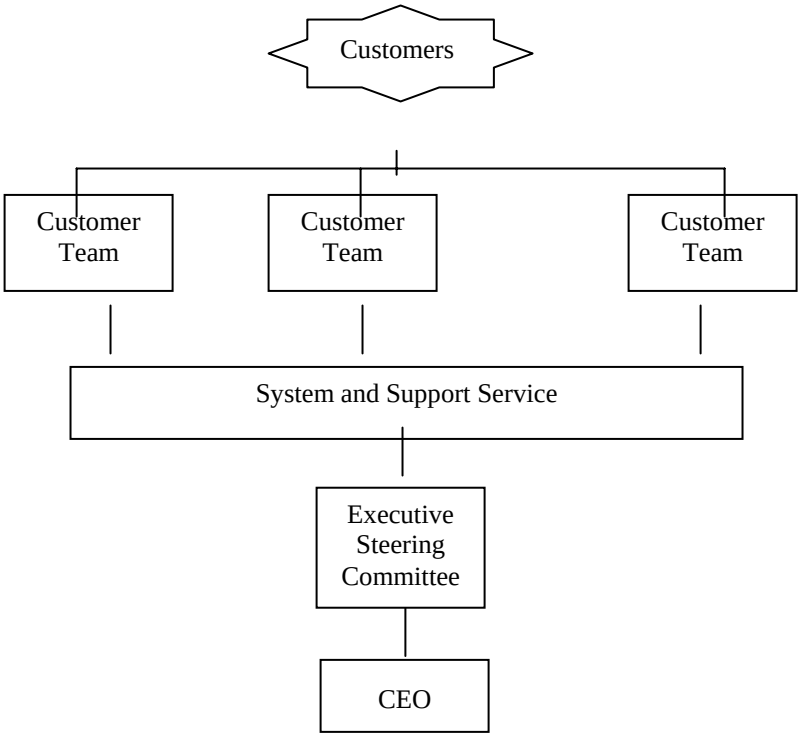
As more and more companies accept the process view of organizations, they are structuring the quality organization around functional or cross-functional teams, each of which has the responsibility to carry out and improve one of the organization's core processes. Depending on the size of the organization and the nature of the processes, teams may include everyone who contributes to a given process or only a representative subset. Similarly, the tams may meet continuously on a crash basis until their new process design is complete, after which they may meet periodically or on an ad hoc basis whenever

necessary. For example, Solectron Corporation, a two-time Baldrige recipient, has a customer focus team for each customer that includes personnel from quality, manufacturing management, project engineering, sales, production control, test engineering, and a project buyer and program manager.

Team based Organizational Structure at one Plant



Team-Based Organizational Chart



Strategic Planning and the Baldrige Award

The Baldrige Award recognizes the importance of integrating total quality principles with overall business planning. The Strategic Planning category addresses strategic business planning and deployment of plans. It stresses tat customer-driven quality and operational performance are key strategic business issues that need to be an integral part of overall company planning, and emphasizes that improvement and learning must be integral parts of company work processes. The special role of strategic planning is to align work processes with the company strategic directions, thereby ensuring that improvement and learning reinforce company priorities.

The Strategic Planning category examines how organizations.

- Plan for the long term, and understand the key influences, risks, challenges, and other requirements that might affect the organization's future opportunities and directions. This is to help ensure that short-term action plans are aligned with the organization's longer-term strategic directions.
- Project the future competitive environment to help detect and reduce competitive threats, shorten reaction time, and identify opportunities.
- Develop action plans and deploy resources – particularly human resources – to achieve alignment and consistency, and provide a basis for setting and communicating priorities for ongoing improvement activities.
- Ensure that deployment will be effective – that a measurement system enables tracking of action plan achievement in all areas.

The integration of quality planning with business planning occurred in the 1995 criteria revision. Most symbolic was the change in the category's title from "Strategic Quality Planning" to "Strategic Planning." This change signaled a "major emphasis on business strategy as the most appropriate view-of-the-future context for managing performance." The integration of quality and operational issues with business planning became a dominant theme, with a focus on "Performance," "Competitive position," "Customer-related," and "Operational" themes.

The ISO-9001 model has still to work out ways how to incorporate strategic planning into business planning; however, it does take good care of tactical and operational quality control.

Lesson # 32

BIG Q AND SMALL q LEADERSHIP FOR QUALITY

Big Q and Small q:

Dr. Juran contrasted the difference between managing to achieve Quality across the Board, in all functions of the organization, and for all the products and services (Big Q) with managing for quality on a limited basis (Little or Small q). Quality Control and inspection activities are little or Small q. Quality Assurance may be Big Q or Small q depending upon how it functions within an organization. Total Quality efforts known as efforts for Big Q. Quality is strategic and requires leadership in all functions and across organization.

Leadership for Quality:

Leadership is fundamental to management and organizational behavior and is on just about everyone's short list of prerequisites for organizational success. Thus it is not surprising that leadership plays a crucial role in the total quality organization. Virtually every article and book written about quality emphasizes leadership. "Teach and institute leadership" is one of W.E. Deming's 14 Points. Leadership is the first category in the Malcolm Baldrige National Quality Award and is recognized as the "driver" of successful quality systems.

Perspectives on Leadership

In practice, the notion of leadership can be as elusive as the notion of quality itself. Most definitions of leadership reflect an assortment of behaviors, for example:

- Vision that stimulates hope and mission that transforms hope into reality;
- Radical servant hood that saturates the organization;
- Stewardship that shepherds its resources;
- Integration that drives its economy;
- The courage to sacrifice personal or team goals for the greater community good;
- Communication that coordinates its efforts;
- Consensus that drives unity of purpose;
- Empowerment that grants permission to make mistakes, encourages the honesty to admit them, and gives the opportunity to learn from them; and
- Conviction that provides the stamina to continually strive toward business excellence.

Although true leadership applies to everyone in an organization we generally think of executive leadership, which focuses on the roles of senior managers in guiding an organization to fulfill its mission and meet its goals, when we use the term.
Why is leadership so important to quality? Leaders establish plans and goals for the organization. If the plans and goals d not include quality or, worse yet, are antithetical to quality, the quality effort will die. Leaders help to shape the culture of the organization through key decisions and symbolic actions. If they help to shape a culture that puts convenience or short-term benefits ahead of quality, it will die. Leadership distributes resources. If resources are showered on programs that cut short-term costs while quality is starved for resources, quality will die. This list could go on. Virtually everything that an organization needs to succeed in meeting its customers' expectations – goals, plans, culture, resources – can either be helped or hurt by leaders. With this in mind, let us examine in more detail the roles that leaders play in a total quality company.

The criteria for the Malcolm Baldrige National Quality Award also dwell heavily on leadership. Here is the philosophy of leadership within the Baldrige criteria:

> An organization's senior leaders should set directions and create a customer focus, clear and visible values, and high expectations . . . The directions, values, and expectations should balance the needs of all your stakeholders. Your leaders should ensure the creation of strategies, systems, and methods for achieving excellence, stimulating innovation, and building knowledge and capabilities. The values and strategies should help guide all activities and decisions of your organization.
>
> Senior leader should inspire and motivate your entire workforce and should encourage all employees to contribute, to develop and learn, to be innovative, and t be creative. Senior leaders should serve as role models through their ethical behavior and their personal involvement in planning, communications, coaching, and development of future leaders, review o organizational performance, and employee recognition. As role models; they can reinforce values and expectations while building leadership, commitment, and initiative throughout your organization.

The roles of a Quality Leader

Underlying the concept of quality leadership are some clear imperatives for managers who aspire to quality leadership. First, they must establish a vision. Second, they must live the values. Third, they must lead the improvement efforts. Let' examine each of these in turn.

Establish a Vision

A vision is a vivid concept of what an organization could be. It is a striking depiction of possibilities, of potential. It is a dream, both in the sense of being desirable and in the sense of being a long ay from the current reality, but it is not an "impossible dream." A vision should be clear and exciting to an organization's employees. It should be linked to customers' needs and convey a general strategy for achieving the mission.

To be quality leaders, managers must establish a vision for and in their organization. "Establishing" a vision implies both the intellectual and emotional work of conceiving the vision and the interpersonal and managerial work of communicating the vision to the organization and leading employees to embrace it. Jane Carroll, president of The Forum Corporation, Europe/Asia, emphasizes the visionary role of leadership for quality, which she calls focus. She believes that most managers do not understand the need for a quality vision and their personal involvement in establishing it:

> In our experience, very few CEOs have a real sense of what their role is in the quality improvement process. It goes far beyond simply being a cheerleader and handing out an occasional award. Top management has to provide the proper focus for the organization. This is not something that can be delegated.

Putting together a vision is hard work, but quality leaders do not have to do it alone. They can draw upon the talents and imagination of all the members of their organizations in developing their vision. In fact, in many organizations, people are walking around with "mini-visions" of their own that sound like "if only we could [do something they have been told can't be done], things would be so much better around here." The raw material for a vision may be all around leaders in the organization. The first step may be simply listening for it. Leaders who are open to the ideas of people throughout the organization will be much better prepared to develop a vision that people will accept.

In the current competitive environment, if a given organization is not pursuing a customer-oriented vision, competing organizations probably are and are planning to use their vision to win over the competition's customers (or are already doing so). This is why a quality vision is such a crucial first step in quality leadership. An organization with no vision about how to create long-term customer loyalty has little chance of survival (unless, of course, it's a monopoly). The second part of establishing a vision

is instilling it in all the members of the organization. This will be a lot easier if many people were involved in the first part of the process, and the leader doesn't act like coming down the from the skies.

Live the Values

Pursuing the quality vision commits the organization to living by a set of values such as devotion to customers, continuous improvement, and teamwork. A manager who hopes the organization will embrace and live by these values must live them to the utmost.

Manager's actions can symbolize their commitment to quality-oriented values in many concrete ways. For example, they can attend training programs on various aspects of quality, instead of just sending others. They can practice continuous improvement in processes that they control, such as strategic planning and capital budgeting. Perhaps most importantly, they can provide adequate funding for quality efforts. So that TQ will not be the "poor cousin" to other business issues.

Lead Continuous Improvement

Beyond establishing vision for the organization and expressing quality values through their decisions and actions, quality-oriented leaders must lead the continuous process improvement efforts that are the meat and potatoes of total quality management. All of the vision and values in the world are worthless if the organization is not continuously making strides to improve its performance in the eyes of customers. Visions of world-class quality and competitiveness can only be achieved if an organization keeps finding ways to do things a little better and a little faster. Leaders must be at the center of these efforts.

Managers are sometime reluctant to take an active role in the organization's improvement efforts for fear of dominating or undercutting their newly empowered workers. Like many aspects of management, this is a question of balance, but it is mistake for managers to remain uninvolved in process improvement efforts.

There are a number of ways for managers to lead continuous improvement, and which ones make the most sense will depend on the specific organization. One option already mentioned is for leaders t lead by example, by working continuously to improve the processes that they control. For some of these processes, organizational members are among the customers, which gives management the opportunity to model for them the behaviors associated with obtaining and acting upon customer input. If management were to streamline the capital budgeting procedure by speeding up the process and eliminating non-value-added activities, it would provide a powerful example for people to emulate.

A second way that managers can lead process improvement is to help organization members prioritize processes to work on. Here managers can take advantage of their knowledge of the "big picture" and suggest avenues of improvement that are likely to have big payoffs in terms of quality improvement and customer satisfaction.

Third way is to inspire people to do things they do not believe they can do. Motorola set aggressive goals of reducing defects per unit of output in ever operation by 100-fold in four years and reducing cycle time by 50 percent each year. One of Hewlett-Packard's goals is to reduce the interval between product concept and investment payback by one-half in five years. The 3M Company seeks to generate 25 percent of sales from products les than two years old. To promote such "stretch goals," leaders provide the resources and support necessary to meet them, especially training.

Of course, managers leading process improvement bear some responsibility for educating al their associates as to how the various processes within the company fit together. If this is done effectively, organization members will be able eventually to set their own priorities for process improvement.

Managers can also lead this effort by removing barriers to success in process improvemet.[16] Barriers may consist of a nettlesome standard operating procedure or a recalcitrant manager in a key position.

Without leadership from management, such barriers may undermine efforts at process improvement. Of course, in dealing with such barriers managers must continue to operate in a manner consistent with quality values. For example managers who balk at changes must be treated with respect and their reservations considered seriously, even if they are eventually overruled.

One final way for managers to lead process improvement is to keep track of improvement efforts, to encourage them, and to provide recognition when key milestones are reached.

Management and Leadership

A recent treatment of leadership by John Kotter compares the concept of leadership to the concept of management. According to this view, management is needed to create order amid complexity, and leadership is needed t stimulate the organizational change necessary to keep up with a changing environment. This view avoids the simplistic ideas that management is some-how trivial, generally unnecessary, and should be replaced by leadership, and that the same person cannot practice both management and leadership.

Kotter differentiates leadership from management by contrasting the activities central to each. While management begins with planning and budgeting, leadership begins with setting a direction. Direction-setting involves creating a vision of the future, as well as a set of approaches for a achieving the vision. To promote goal achievement, management practices organizes and staffing, while leadership works on aligning people-communicating the vision and developing commitment to it. Management achieves plans through controlling and problem solving, whereas leadership achieves its vision through motivating and inspiring.

Kotter's view of leadership – similar to transformational theory – dovetails with our depiction of quality leadership. Both focus on developing and communicating a vision. Kotter's view of inspiring resembles our discussion of giving people values to embrace and then making sure that the leaders is practicing them.

The idea of aligning people is consistent with the idea of empowerment, because it gives people a goal, and then leaves them to move in that direction. Our description of the role of leaders in continuous improvement is more hands-on than Kotters description, perhaps suggesting that some management behaviors will continue to be important to leaders in total quality organizations.

Lesson # 33

STRATEGIC PLANNING FOR QUALITY AND ADVANCED QUALITY MANAGEMENT TOOLS

A firm has many options in defining its long-terms goals and objectives, the customers it wants to serve, the products and services it produces and delivers, and the design of the production and service system to meet these objectives. Strategic planning is the process by which the members of an organization envision its future and develop the necessary procedures and operations to carry out that vision. Strategy – the result of strategic planning – is the patter of decisions that determines and reveals a company's goals, polices, and plans to meet the needs of its stakeholders. An effective strategy allows a business to create a sustainable competitive advantage.

Total quality relates to strategic management in that it enhances an organization's ability to gain a sustainable competitive advantage in the marketplace. Handled properly. Total quality can be the most effective cost leadership and/or differentiation strategy an organization can adopt. This is because the total quality approach is the best way to continually improve efficiency and cut costs throughout an organization's activity-cost chain, while simultaneously continually improving the features of the product or service that differentiates it in the marketplace. Total quality can also improve an organization's chances of becoming a leader in a given market niche.

What is Strategic Management?

To understand strategic management, one must first understand the concept of organizational strategy. Strategies are defined as follows:

> Organizational strategies are the approaches adopted by organizations to ensure successful performance in the marketplace. These approaches are typically set forth in a comprehensive document called the strategic plan.

Strategic management is management that bases all actions, activities, and decisions on what is most likely-within an ethical framework to ensure successful performance in the marketplace. From the strategic manager's perspective. Resources are wasted unless they contribute to success in the marketplace, and the more direct the contribution, the better.

Quality as a Strategy

The concept of strategy has different meanings to different people. James Brian Quinn characterizes strategy as follows:

> A strategy is a pattern or plan that integrates an organization's major goals, policies, and action sequences into a cohesive whole. A well formulated strategy helps to marshal and allocate an organization's resources into a unique and viable posture based on its relative internal competencies and shortcomings, anticipated changes in the environment, and contingent moves by intelligent opponents.

Formal strategies contain three elements:

4. Goals to be achieved,
5. Policies that guide or limit action, and
6. Action sequences, or programs, that accomplish the goals.

The traditional focus of business strategies has been on finance and marketing. These parallel two of the principal sources of competitive advantage based on cost and differentiation. Total quality – with a focus on people – leads to improvements in both areas. Therefore, quality can be viewed as a strategy in itself.

The role of quality in business strategy has taken two significant steps since 1980. First, many firms have recognized that a strategy driven by quality can lead to significant market advantages. Second, the lines between quality strategy and generic business strategies have become blurred to the point where TQ principles are integrated into most businesses' normal business planning; that is, TQ is a basic operating philosophy that provides the foundation for effective management.

For most companies, integration of TQ into strategic business planning is the result of a natural evolution. For most new companies – or those that have enjoyed a reasonable measure of success – quality takes a back seat to increasing sales, expanding capacity, or boosting production. Strategic planning usually focuses on financial and marketing strategies.

Components of Strategic Management

Strategic management consists of two interrelated activities: (a) strategic planning and (b) strategic execution. These two primary components of strategic management are described in the following sections.

Strategic Planning

Strategic planning is the process by which an organization answers such questions as the following: Who are we? Where are we going? How will we get there? What do we hope to accomplish? What are our strengths and weaknesses? What are the opportunities and threats in our business environment? Strategic planning involves developing a written plan following components: an organizational vision: an organizational mission; guiding principles; broad strategic objectives; and specific tactics, projects, or activities for achieving the broad objectives. Specific tactics, projects, and activities are often referred to as the "action plan."

Strategic Execution

Strategic execution involves implementing strategies set forth in strategic planning. Monitoring progress toward their achievement, and adjusting as necessary. Strategic execution is implementation that achieves maximum efficiency and effectiveness.

Monitoring involves constantly checking actual performance against performance benchmarks. Strategic monitoring answers such questions as these: Are we achieving our objectives? This is the effectiveness question. Are we performing as well as we need to perform? This is the efficiency question. Adjusting as necessary involves making corrections when the specific strategies or tactics adopted are not producing the desired results. Such adjustments can involve a minor tweaking of plans finding ways to overcome unexpected barriers that are encountered or even adopting a whole new set of specific strategies.

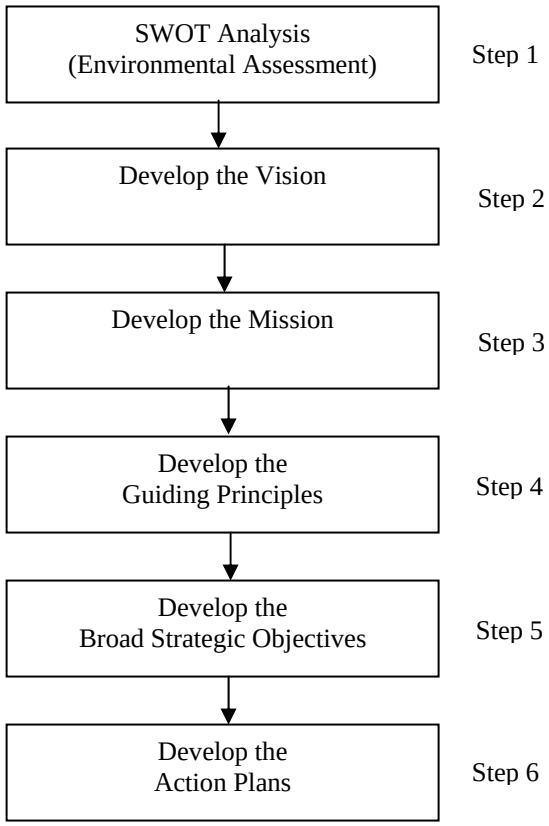
Strategic Planning Overview

Strategic planning, as described previously is the process whereby organizations develop a vision, a mission, guiding principles, broad objectives, and specific strategies for achieving the broad objectives. Before even beginning the planning process, an organization should conduct a SWOT analysis. SWOT is the acronym for strengths, weaknesses, opportunities, and threats. A SWOT analysis answers the following questions: What are this organization's strengths? What are this organization's weaknesses? What opportunities exist in this organization's business environment? What threats exist in this organization's business environment?

The steps in the strategic planning process (Following Figure) should be completed in order, because each successive step grows out of the preceding one. The SWOT analysis provides a body of knowledge that is needed to undertake strategic planning. The mission grows out of and supports the vision. The guiding principles, which represent the organization's value system, guide the organization's behavior as

it pursues its mission. The broad objectives grow out of the mission and translate it into measurable terms; Specific strategies tie directly to the broad objectives. Typically there will be two to five strategies for; each objective but this is a general guideline, not a hard and fast rule.

Strategic Planning Process



Strategic Planning and the Baldrige Award

The Baldrige Award recognizes the importance of integrating total quality principles with overall business planning. The Strategic Planning category addresses strategic business planning and deployment of plans. It stresses that customer-driven quality and operational performance are key strategic business issues that need to be an integral part of overall company planning, and emphasizes that improvement and learning must be integral parts of company work processes. The special role of strategic planning is to align work processes with the company strategic directions, thereby ensuring that improvement and learning reinforce company priorities.

The Strategic Planning category examines how organizations;

- Plan for the long term, and understand the key influences, risks, challenges, and other requirements that might affect the organization's future opportunities and directions. This is to help ensure that short-term action plans are aligned with the organization's longer-term strategic directions.
- Project the future competitive environment to help detect and reduce competitive threats, shorten reaction time, and identify opportunities.
- Develop action plans and deploy resources – particularly human resources – to achieve alignment and consistency, and provide a basis for setting and communicating priorities for ongoing improvement activities.

- Ensure that deployment will be effective – that a measurement system enables tracking of action plan achievement in all areas.

The integration of quality planning with business planning occurred in the 1995 criteria revision. Most symbolic was the change in the category's title from "Strategic Quality Planning" to "Strategic Planning." This change signaled a "major emphasis on business strategy as the most appropriate view-of-the-future context for managing performance." The integration of quality and operational issues with business planning became a dominant theme, with a focus on "performance," "Competitive position," "customer-related," and "operational" themes.

Conducting the SWOT Analysis

The rationale for conducting a SWOT analysis before proceeding with the development of the strategic plan is that the organization's plan should produce a good fit between its internal situation and it external situation. An organization's internal situation is defined by its strengths and weaknesses. An organization's external situation is defined by the opportunities and threats that exist in its business environment. The strategic plan should, be designed in such away that it exploits an organization's strengths and opportunities, while simultaneously overcoming, accommodating, or circumventing weaknesses and threats.

Identifying Organizational Strengths

An organizational strength is any characteristic or capability that gives the organization a competitive advantage. The following are examples of common organizational strengths:

- Financial strength
- A good reputation in the marketplace
- Strategic focus
- High-quality products/services
- Proprietary products/services
- Cost leadership
- Strong management team
- Efficient technological processes
- Talented workforce
- Faster time to market

These are just some of the strengths an individual organization may have: many others are possible. The key is accurately defining an organization's strengths before beginning to develop its strategic plan.

Identifying Organizational Weaknesses

An organizational weakness is any characteristic or capability that is lacking to the extent that it puts the organization at a competitive disadvantage. These are examples of common organizational weaknesses:

- Strategic confusion/lack of direction
- Obsolete facilities
- Obsolete processes
- Weak management team
- Insufficient skills/capabilities in the workforce
- Poorly defined operating procedures
- Too narrow a product line
- Products with decreasing demand
- Too diverse a product line
- Poor image in the marketplace
- Weak distribution system

- Weak financial position
- High unit costs compared with those of competitors
- Poor quality in products/services

These are just a few of many weaknesses an organization may have. The main thing is to identify an organization's weaknesses accurately before undertaking the strategic planning process.

Identifying External Opportunities

External opportunities are opportunities in the organization's business environment that represent potential avenues for growth and/or gaining a sustainable competitive advantage. The following are examples of external opportunities that organizations may have:

- Availability of new customers
- An expanding market for .existing or potential/planned products
- Ability to diversify into related products/services
- Removal of barriers that inhibit growth
- Failures of competitors
- New on-line technologies that enhance productivity or quality

Of course, other external opportunities might be available to an organization besides these. You need to identify all such opportunities accurately before undertaking the strategic planning process.

Identifying External Threats

An external threat is a phenomenon in an organization's business environment that has the potential to put the organization at a competitive disadvantage. Such external threats might include the following:

- Entry of lower cost competitors
- Entry of higher quality competitors
- Increased sales of substitute products/services
- Significant slowdown in market growth
- Introduction of costly new regulatory requirements
- Poor supplier relations
- Changing tastes and habits of consumers
- Potentially damaging demographic changes

Many other external threats might confront an organization. Accurately identifying every potential external threat before you begin the strategic planning process is a must.

Developing the Vision

An organization's guiding force, the dream of what it wants to become, and its reason for being should be apparent in its vision. A vision is like a beacon in the distance toward which the organization is always moving. Everything about the organization-its structure, policies, procedures, and allocation of resources-should support the realization of the vision. In an organization with a clear vision, it is relatively easy to stay appropriately focused. If a policy does not support the vision, why have it? If a procedure does not support the vision, why adopt it? If an expenditure does not support the vision. Why make it? If a position or even a department doesn't support the vision, why keep it? An organization's vision must be established and articulated by executive management and understood by all employees. The first step in articulating an organizational vision is writing it down. This is called the vision statement.

Developing the Mission

We have just seen that the vision statement describes what an organization would like to be. It's a dream, but it's not “pie in the sky”. The vision represents a dream that can come true. The mission takes

the next step and describes who the organization is, what it does. and where it is going. In developing the mission statement for any organization, one should apply the following rules of thumb:

- Describe what, and where of the organization, making sure the component describes the organization and its customers.
- Be brief, but comprehensive. Typically one paragraph should be sufficient to describe an organization's mission.
- Choose wording that is simple, easy to understand, and descriptive.
- Avoid how statements. How the mission will be accomplished is described in the "Strategies" section of the strategic plan.

Developing the Guiding Principles

An organization's guiding principles establish the framework within which it will pursue its mission. Each guiding principle encompasses an important organizational value. Together, all of the guiding principles represent the organization's value system—the foundation of its corporate culture.

Developing Broad Strategic Objectives

Broad strategic objectives translate an organization's mission into measurable terms. They represent actual targets the organization aims at and will expend energy and resources trying to achieve. Broad objectives are more specific than the mission, but they are still broad. They still fall into the realm of what rather than how. The how aspects of strategic planning come in the next step: developing specific tactics, projects, and activities for accomplishing broad objectives.

Developing Specific Tactics (Action Plan)

The action plan consists of specific tactics that are well-defined, finite projects and activities undertaken for the purpose of achieving a specific desired outcome. They are undertaken for the purpose of accomplishing an organization's broad strategic objectives. Tactics have the following characteristics. They are SMART:

- Are specific in nature
- Are measurable
- Can be quantifiable
- Can be accomplished within a specified time frame
- Can be assigned to a specific individual or group
- Are tied directly to a broad objective

Revolutionary Thinking in Strategic Planning

Writing for the Harvard Business Review, Gary Hamel makes a case for revolutionary thinking as a business strategy; He describes three types of companies that can be found in any industry:

- *Rule makers*- These are the companies that built the industry in question. IBM, Sears, and Coca-Cola are examples of rule makers.
- *Rule takers*- These are the companies that follow the rules made by the industry leaders. J. C. Penney, Fujitsu, and U.S. Air exemplify rule takers.
- *Rule breakers*- These are the maverick companies that break the rules, ignore precedent, and cast aside convention. IKEA, Charles Schwab, and Southwest Airlines are rule breakers.

Before beginning strategic planning, executives must decide which of these three types of companies they want. Rule makers adopt one type of vision, rule takers adopt another. and rule breakers, yet another. Rule makers will adopt a vision in which they dominate and set the rules in a given market.

Rule takers will adapt a vision in which they are industry leaders but perennially less than first-place finishers; their strategies will focus on continuous incremental improvement to work their way ever closer to the market leader. Rule breakers will adopt a vision that focuses on carving out a market niche that because of its characteristics may not be well served by the market leaders. Such companies will then seek to dominate their niche market.

The Strategic Management Process Re-Cap:

Strategic planning helps leadership mold an organization's future and manage change by focusing on an ideal vision of what the organization should and could be 10 to 20 years in the future. In contrast, the term "long range planning" may mean only one year in the future or the next budget submission in many organizations. Strategic plans are developed at the highest level of an organization and deployed throughout.

The strategic management process consists of two parts: formulation and implementation. Strategy formulation consists of defining the mission of the organization – the concept of the business and the vision of where it is headed; setting objectives – translating the mission into specific performance objectives; and defining a strategy – determining specific actions to achieve the performance objectives. Planning is good but implementation is difficult and requires various tools and skillets. Implementation focuses on executing the strategy effectively and efficiently, as well as on evaluating performance and making corrective adjustments when necessary.

Advanced Quality Management Tools:

To create added value for the customer and for Prevention rather than Correction, Japanese developed the new tool set designed to address strategic issues in quality. These management planning tools are known as Advanced Quality Tools and are as follows:

1. Matrix Diagram
2. Relations Diagram
3. Affinity Diagram
4. Systematic or Tree Diagram
5. Matrix data Analysis
6. Arrow Diagrams
7. Process Decision Program Chart

Lesson # 34

HOSHIN KANRI AND STRATEGIC POLICY DEPLOYMENT

Strategy Implementation:

Top management requires a method to ensure that their plans and strategies are successfully executed (the term "deployed" is frequently used) within the organization. The Japanese deploy strategy through a process known as Hoshin Planning, or Policy Deployment. Hoshin means policy or policy deployment. Policy deployment is a systems approach to managing change in critical business processes. It emphasizes organization-wide planning and setting of priorities, providing resources to meet objectives, and measuring performance as a basis for improving performance. Policy deployment is essentially a TQ-based approach to executing a strategy. King describes it eloquently.[5]

> Imagine an organization that knows what customers will want five to ten years from now and exactly what they will do to meet and exceed all expectations. Imagine a planning system tat has integrated [Plan, Do, Check, Act] language and activity based on clear, long-term thinking, a realistic measurement system with a focus on process and results, identification of what's important, alignment of groups, decisions by people who have the necessary information, planning integrated with daily activity, good vertical communication, cross-functional communication, and everyone planning for himself or herself, and the buy-in that results. That is Hoshin Planning.

With policy deployment, top management is responsible for developing and communicating a vision, then building organization-wide commitment to its achievement. This vision is deployed through the development and execution of annual policy statements (plans). All levels of employees actively participate in generating a strategy and action plans to attain the vision.

At each level, progressively more detailed and concrete means to accomplish the annual plans are determined. The plans are hierarchical, cascading downward from top management's plans. There should be a clear link to common goals and activities throughout the organizational hierarchy. Policy deployment provides frequent evaluation and modification based on feedback from regularly scheduled audits of the process. Plans and actions are developed based on analysis of the root causes of a problem, rather than only on the symptoms. Planning has a high degree of detail, including the anticipation of possible problems during implementation. The emphasis is on the improvement of the process, as opposed to a results-only orientation.

An example of policy deployment is provided by very well known Japanese, Mr. Imai:

> To illustrate the need for policy deployment, let us consider the following case: The president of an airline company proclaims that he believes in safety and that his corporate goals are to make sure that safety is maintained throughout the company. This proclamation is prominently featured in the company's quarterly report and its advertising. Let us further suppose that the department managers also swear a firm belief in safety. The catering manager says he believes in safety. The pilots say they believe in safety. The flight crews say they believe in safety. Everyone in the company practices safety. True? Or might everyone simply be paying lip service to the idea of safety?
>
> On the other hand, if the president states that safety is company policy and works with his division managers to develop a plan for safety that defines responsibilities, everyone will have a very specific subject to discuss. Safety will become a real concern. For the manager in charge of catering services, safety might mean maintaining the quality of food to avoid customer dissatisfaction or illness.

In that case, how does he ensure that the food is of top quality? What sorts of control points and checkpoints does he establish? How does he ensure that there is no deterioration of food quality in flight? Who checks the temperature of the refrigerators or the condition of the oven while the plane is in the air?

Only when safety is translated into specific actions with specific control and checkpoints established for each employee's jobs may safety be said to have been truly deployed as a policy. Policy deployment calls for everyone to interpret policy in light of their own responsibilities and for everyone to work out criteria to check their success in carrying out the policy.

Policy deployment starts with the senior managers of the company. The senior managers establish the vision and core objectives of the company. An example of an objective might be "to improve delivery," which supports the long-term vision of "to be the industry leader in customer satisfaction. "Middle management negotiates with senior management regarding the goals that will achieve the objectives. Goals specify numerically the degree of change that is expected.

Strategies specify the means to achieve the goals. They include more specific actions to be taken. Middle managers are responsible for managing the resources to accomplish the goals. Middle management then negotiates with the implementation teams regarding the performance measures that are used to indicate progress toward accomplishing the strategies.

Measures are specific checkpoints to ensure the effectiveness of individual elements o the strategy. The implementation teams are empowered to manage the actions and schedule their activities. Senior management then uses a review process t understand both the progress of the implementation team sand the success of their planning system.

Roles in Implementing a Quality Strategy

Senior management, middle management, and the workforce each have a critical role to play in the implementation process. Senior managers must ensure that their plans and strategies are successfully executed within the organization. Middle mangers provide the leadership by which the vision of senior management is translated into the operation of the organization. In the end, it is the workforce that delivers quality and must have not only empowerment, but also a true commitment to quality for TQ to succeed.

Senior Management

Senior managers must ensure that the organization is focusing on the needs of the customer. They must promote the mission, vision, and values of the company throughout the organization. Senior managers must identify the critical processes that need attention and improvement and the resources and trade-offs that must be made to fund the TQ activity. They must review progress and remove barriers to implementation. Finally, they must improve the processes, in which they are involved (strategic planning, for example), both to improve the performance of the process and to demonstrate their ability to use quality tools for problem solving.

Middle Management

Transforming middle managers into change agents requires a systematic process that dissolves traditional management boundaries and replaces them with an empowered and team-oriented state of accountability for organizational performance. This process involves the following:

1. Empowerment. Middle managers must be accountable for the performance of the organization in meeting objectives

2. Creating a common vision of excellence. This vision is then transformed into critical success factors that describe key areas of performance that relate to internal and external customer satisfaction.
3. New rules for playing the organizational game. Territorial wall must be broken, yielding a spirit of teamwork. One new approach is interlocking accountability, in which all managers are account able to one another for their performance. The second is team representation, in which each manager is responsible for accurately representation, in which each manager is responsible for accurately representing the ideas and decisions of the team to others outside the team.
4. Implementing a continuous improvement process. These projects should improve operational systems and process.
5. Developing and retaining peak performers. Middle managers must identify and develop future leaders of the organization.

The Workforce

The workforce must develop ownership of the quality process. Ownership and empowerment gives employees the right to have a voice in deciding what needs to be done and how to do it. It is based on a belief that what is good for the organization is also good for the individual and vice versa.

Training, recognition, and better communication are key success factors for transferring ownership in the workforce. With increased ownership, however, come a flatter organization – and the elimination of some middle managers. Increased ownership also requires increased sharing of information with the workforce and a commitment to the workforce in good times and in bad. This might mean reducing stock dividends and executive bonuses before lying of the workforce during economic downturns.

Lesson # 35

QUALITY FUNCTION DEPLOYMENT (QFD) AND OTHER TOOLS FOR IMPLEMENTATION

Tools for Quality Planning:

Customer's needs and expectations drive the planning process for products and the systems by which they are produced. Marketing plays a key role in identifying customer expectations. That is what is known Voice of Customer in QFD or WHAT in a simple Matrix Diagram. Once these are identifies, managers must translate them into specific products and service specifications that manufacturing and service delivery processes of the organizations (Voice of Process in QFD or HOW in Matrix Diagram) must meet. In some cases the product or service that customers receive is quite different from what they expect. It is management's responsibility to minimize such gaps. Firms use several tools and approaches to help them focus on their external and internal customers.

Matrix Diagram: These are spreadsheets that graphically display relationships between characteristics, functions, and tasks in such a way as to provide logical connecting points between each item. QFD is one of many matrix diagrams now used for planning and quality improvements.

Relations Diagram: Purpose of this tool is taken a central idea and map out logical or sequential links among related categories. Every idea can be logically linked with more than one idea at a time. It allows lateral rather than linear thinking.

Affinity Diagram: This is a technique for gathering and organizing a large number of ideas, opinions, and facts relating to a broad problem or subject area. It enables problem solvers to sift through large volumes of information efficiently and to identify natural patterns or grouping among information.

Tree Diagram: It maps out the paths and tasks that need to be accomplished to complete a specific project or to reach a specific goal.

Arrows Diagram: These have been used by construction planners for years in the form of CPM and PERT project planning techniques.

Process Decision Program Chart: This is a method for mapping out every conceivable event and contingency that can occur when moving from a problem statement to possible solutions. It is used to plan for each possible chain of events that could occur when a problem or goal is unfamiliar.

House of Quality or Quality Function Deployment: QFD is a methodology used to ensure that customer's requirements are met throughout the product design process and in the design and operation of production systems. QFD is both a philosophy and a set of planning and communication tools that focuses on customer requirements in coordinating the design, manufacturing, and marketing of goods. A major benefit of QFD is improved communication and teamwork among all constituencies in the production process---- marketing and design, design and manufacturing/production, and purchasing and suppliers. QFD allows companies to bring new products into the market sooner and to gain competitive advantage.

QFD is an overall concept that provides a mean of translating customer requirements into appropriate technical requirements for each stage of product development and production. Voice of Customer is collection of all satisfiers, delighters/exciters and dissatisfies….i.e. WHAT part of a matrix that customers want from a product.

Under QFD, all operations of a company or Voice of Processes are driven by the voice of customer, rather than by top management or design engineer's opinion. Technical features are the translation of the voice of customer into technical language. These are the HOW part in the matrix.

A set of matrices is used to relate in every stage of production. The basic planning document is called the customer requirement planning matrix. Because of its structure, it is often called as the House of Quality. Building it requires WHAT/HOW or VOC/VOP relations.

- Identifying customer attributes
- Identifying technical features
- Relate attribute to technical features
- Evaluating the competing product design
- Evaluating technical features and the development of the targets
- Determine / Decide which feature to deploy in the production process
- Produce, market and collect data on customer satisfaction

Compare the VOC for a Burger with attributes of burger being tasty, healthy, visually appealing, and provide good value for money with VOP of company for Pricing of burger, its Size, and Fat/Lean value etc for final customer satisfaction and then deploy and deliver for a sustainable business of a fast food restaurant.

Lesson # 36

BASIC SQC IMPROVEMENT TOOLS

Tools for Continuous Improvement:

Many tools have been created or adapted from other disciplines (such as operations research and industrial engineering) to facilitate the process of continuous improvement. Here we learn the most common ones used in quality improvement applications.

One of the basic tenets of total quality is management by facts. Management by facts requires that each decision, each solution to a problem, is based on relevant data and appropriate analysis. Problem solving and decision making are fundamental to total quality. On the one hand, good decisions will decrease the number of problems that occur. On the other hand, the workplace will never be completely problem free.

Once we get beyond the very small business (in which the data are always resident in the few heads involved, anyway), most decision points and problems will have many impacting factors, and the problem's root cause or the best-course decision will remain obscure until valid data are studied and analyzed. Collecting and analyzing data can be difficult. The total quality tools use will assure better decision making, better solutions to problems, and even Improvement of productivity and products and services.

Writing about the use of statistical methods in Japan, Dr. Ishikawa said:

The so-called seven indispensable tools . . . that are being used by everyone: company presidents, company directors, middle management, foremen, and line workers. These tools are also used in a variety of [departments], not only in the manufacturing [department] but also in the [departments] of planning, design, marketing, purchasing, and technology." No matter where you fit into your organization today, you can use some or all of these tools to advantage, and they will serve you well for your future prospects.

PROBLEM SOLVING FOR TOTAL QUALITY

If you ask the typical manager to describe his or her biggest problem in today's work-place, the response will probably include one or more of the following:

- We spend all our time in meetings trying to resolve problems.
- We are constantly fighting problems, and that doesn't leave us time to do our real jobs, such as planning, leading, and so forth.
- As soon as we "put out one fire," another pops up.
- We've got more problems than we can handle, and it bogs us down.

The actual words may vary, but the message is the same. The workplace can be so burdened with problems that managers and others spend so much time trying to fix them that nothing gets done right. With problem solutions leading to process or products/service improvement,

- product or service quality improves
- costs decrease (through less waste and warranty action)
- customer satisfaction improves
- competitiveness improves, and
- the probability for success improves

Clearly all of these outcomes are desirable. And they are all achievable by applying the total quality principles to problem solving.

TOTAL QUALITY TOOLS DEFINED

Carpenters use a kit of tools designed for very specific functions. Their hammers, for example, are used for the driving of nails. Their saws for the cutting of wood. These and others enable a carpenter to build houses. They are physical tools. Total quality tools also enable today's employees, whether engineers, technologists, production workers, managers, or office staff, to do their jobs. Virtually no one can function in an organization that has embraced total quality without some or all of these tools.

Unlike those in the carpenter's kit, these are intellectual tools: they are not wood and steel to be used with muscle; they are tools for collecting and displaying information in ways to help the human brain grasp thoughts and ideas. When thoughts and ideas are applied to physical processes, the processes yield better results. When applied to problem solving or decision making, better solutions and decisions are developed.

The seven tools discussed below represent those generally accepted as the basic total quality tools. A case can be made that just-in-time, statistical process control, and quality function deployment are total quality tools. But these are more than tools: they are complete systems under the total quality umbrella. A tool, like a hammer, exists to help do a job. If the job includes continuous improvement, problem solving, or decision making, then these seven tools fit the definition. Each of these tools is some form of chart for the collection and display of specific kinds of data. Through the collection and display facility, the data become useful information-information that can be used to solve problems, enhance decision making, keep track of work being done, even predict future performance and problems. The beauty of the charts is that they organize data so that we can immediately comprehend the message. This would be all but impossible without the charts, given the mountains of data flooding today's workplace.

Tools for Data Collection and Analysis

Seven simple statistically based tools are used extensively to gather and analyze data. Unlike the seven advanced management and planning tools, these tools are visual in nature and simple enough for anyone to understand.

These seven basic tools of quality are

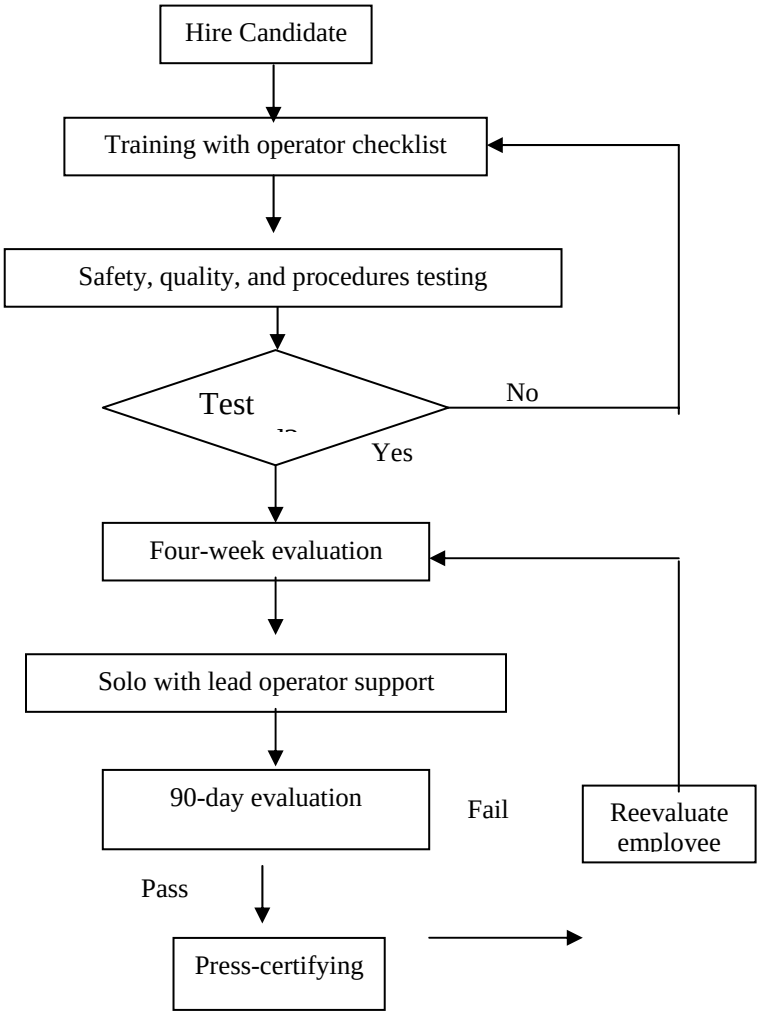
1. Flow-charts,
2. Check sheets,
3. Histograms,
4. Pareto diagrams,
5. Cause-and-Effect diagrams,
6. Scatter diagrams, and
7. Control charts

Historically, these tools preceded the seven management and planning tools and often are called the “seven QC (Quality Control) tools.” The seven management and planning tools have been referred to as the “new advanced seven.”

Flowcharts:

A flowchart is a picture of a process that shows the sequence of steps performed. Flowcharts are best developed by the people involved in the process–employees, supervisors, managers, and customers. A facilitator often is used to provide objectivity, to ask the right questions, and to resolve conflicts. The facilitator can guide the discussion through questions such as “What happens next?” “Who makes the decision at this point?” and “what operation is performed here?”

Example of a Flowchart for Training New Printing Press Operators



Flowcharts help the people involved in the process to understand it better. For example, employees realize how they fit into a process–that is, who their suppliers and customers are. By helping to develop a flowchart, workers begin to feel a sense of ownership in the process and become more willing to work on improving it. Using flowcharts to train employees on standard procedures leads to more consistent performance.

Once a flowchart is constructed, it can be used to identify quality problems as well as areas for improvement. Questions such as "How does this operation affect the customer?" "Can we improve or element this operation?" or "Should we control a critical quality characteristic at this point?" help to identify such opportunities. Flowcharts help people to visualize simple but important changes that could be made in a process.

Check Sheets

These tools aid in data collection. When designing a process to collect data, one must first ask basic questions such as:

- What question are we trying to answer?
- What type of data will we need to answer the question?
- Where can we find the data?

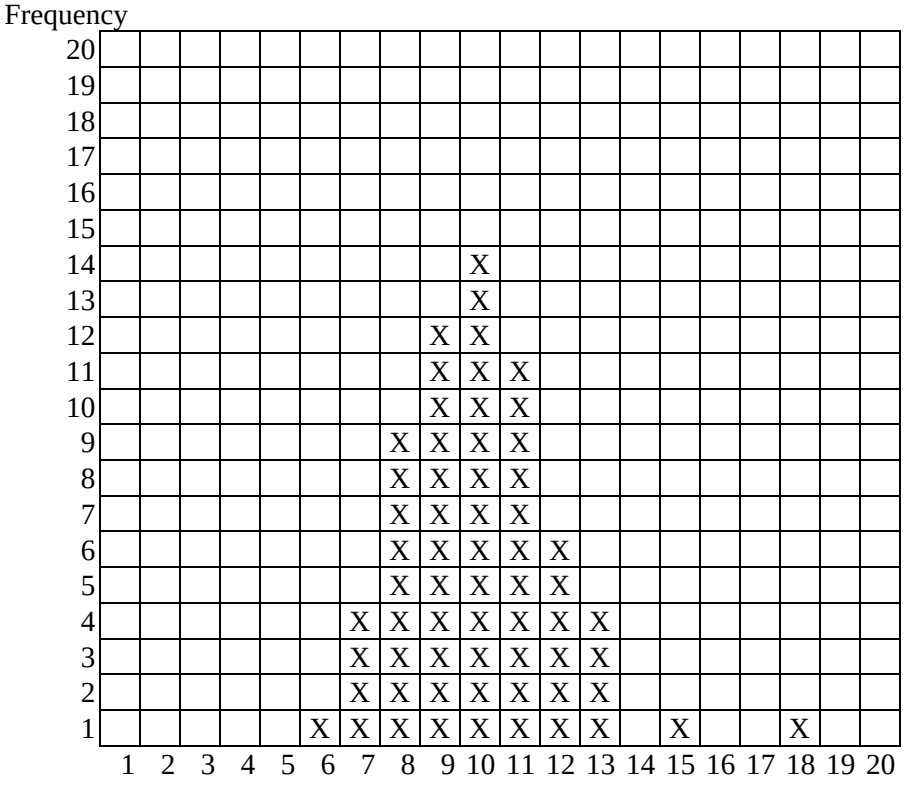
- Who can provide the data?
- How can we collect the data with minimum effort and minimum chance of error?

Check sheets are data collection forms that facilitate the interpretation of data. Quality-related data are of two general types–attribute and variable. Attribute data are obtained by counting or from some type of visual inspection: the number of invoices that contain errors, the number of parts that conform to specifications, and the number of surface defects on an automobile panel, for example. Variable data are collected by numerical measurement on a continuous scale. Dimensional characteristics such as distance, weight, volume, and time are common examples. Figure below is an example of an Attribute data check sheet, and second Figure below shows a Variable data check sheet.

Example of a Check Sheet for Attribute Data: Airline Complaints

Type	Week 1	Week 2	Week 3	Week 4
Lost baggage	1		2	1
Baggage delay	4	4	5	3
Missed connection	2	1	3	1
Poor cabin service	3	3	3	3
Ticketing error	1			1

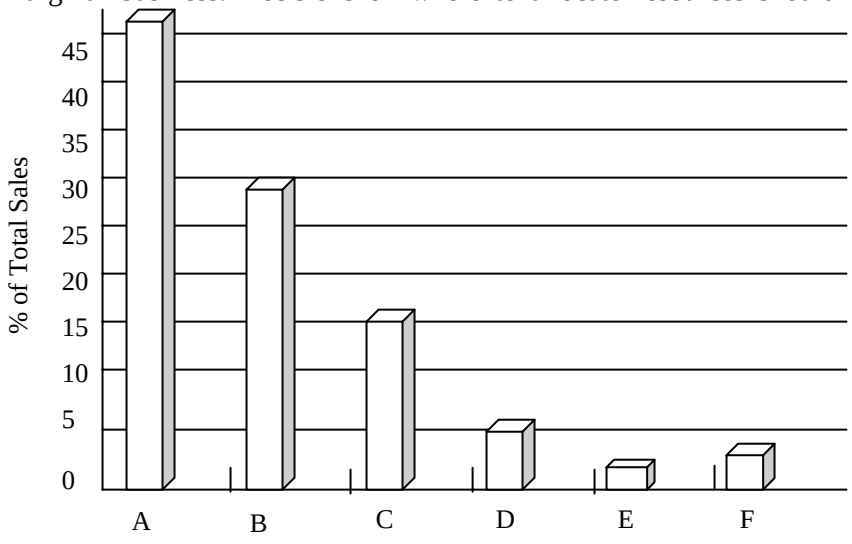
Example of a Check Sheet for Variable Data



Pareto Diagram

The Pareto chart is a very useful tool wherever one needs to separate the important from the trivial. The chart, first promoted by Dr. Joseph Juran, is named after Italian economist/sociologist Vilfredo Pareto (1848-1923). He had the insight to recognize that in the real world a minority of causes lead to the majority of problems. This is known as the Pareto principle. Pick a category, and the Pareto principle will usually hold. For example, in a factory you will find that of all the kinds of problems you can name, only about 20% of them will produce 80% of the product defects: 80% of the cost associated with the defects will be assignable to only about 20% of the total number of defect types occurring. Examining the elements of this cost will reveal that once again 80% of the total defect costs will spring from only about 20% of the cost elements. Charts have shown that approximately 20% of the pros on the tennis tour reap 80% of the prize money and that 80% of the money supporting churches in the United States comes from 20% of the church membership.

Pareto analysis is a technique for prioritizing types or sources of problems. Pareto analysis separates the “vital few” from the “trivial many” and provides help in selecting directions for improvement. The Pareto chart below labels a company's customers A. B. C, D, E. and All Others. The bars represent the percentage of the company's sales going to the respective customers. Seventy-five percent of this company's sales are the result of just two customers. If one adds customer C, 90% of its sales are accounted for. All the other customers’ together account for only 10% of the company's sales. Bear in mind that
“Other" may include a very large number of small customers. Which customers are the ones who should be kept happy? Obviously, A, B, and perhaps C are the most critical.
This would suggest that customers A, B, and Care the company's core market and all the other customers represent a marginal business. Decisions on where to allocate resources should be made accordingly.



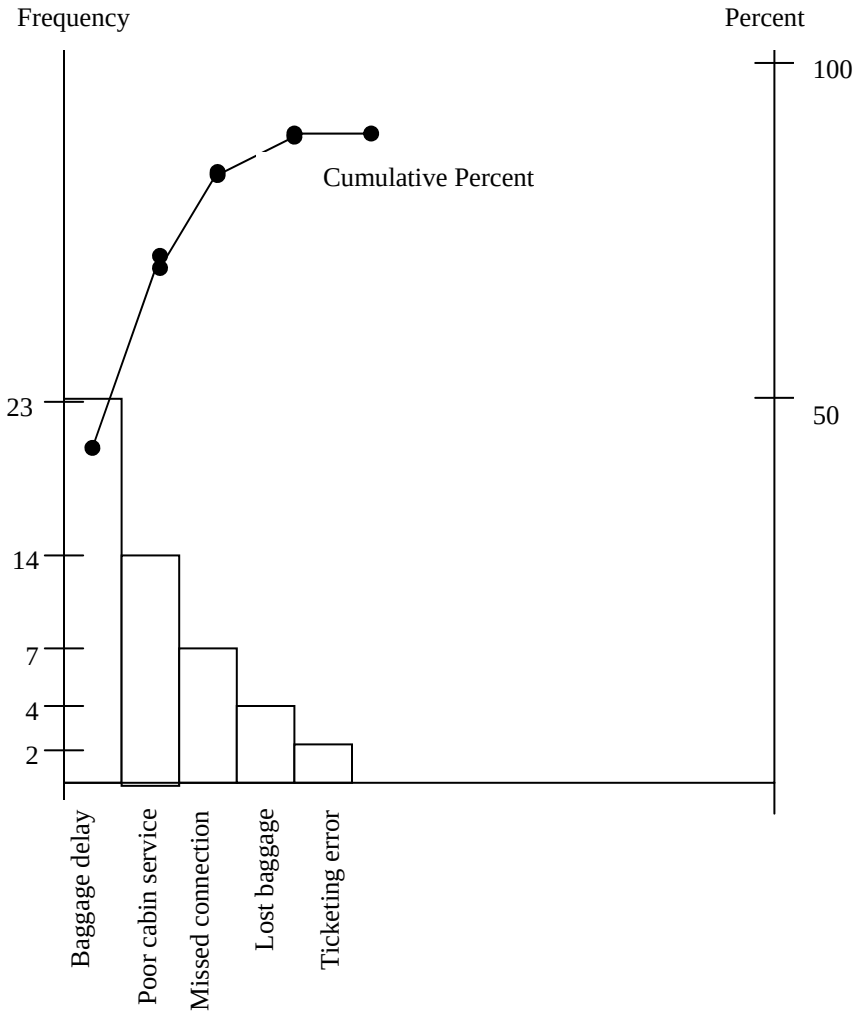
Pareto Chart: Percentage of Total Sales by C

It is often used to analyze the attribute data collected in check sheets. In a Pareto distribution the characteristics are ordered from largest frequency to smallest. For example, if the airline attribute data in check sheet above is placed in order of decreasing frequency, the result below is shown as a Pareto in descending order to focus on vital few is

1. Baggage delay
2. Poor Cabin service
3. Missed connection
4. Lost baggage
5. Ticketing error

A Pareto diagram is a histogram of these data, as shown in above Figure. A cumulative frequency curve is usually drawn on the histogram, as shown above. Such pictures clearly show the relative magnitude of defects and can be used to identify the most promising opportunities for improvement (the few faults which causing 80% of problems.) They can also show the results of improvement projects over time by drawing Pareto after every project is complete.

Example of a Pareto Diagram



Lesson # 37

HOW QUALITY IS IMPLEMENTED? A DIALOGUE WITH A QUALITY MANAGER!

After listening to the discussion on quality in Pakistan, we are happy that Pakistani managers are as concerned about quality in their companies as any country in the world. The globe is approachable by every customer now and we need to understand that a competitor can emerge from any where in the world over night.

Post WTO and internet based economy era put a lot of pressure on mangers to deal with customers of 21st century, who are more aware and are more demanding and want innovation their products or services and also at lower price.

In other words, decreasing price should not lower the quality of offerings otherwise company may loose their market to another local or multi-national supplier. One has to understand the demands of their market and deliver them at a price which is acceptable to them with no sacrifice on quality, speed and attributes.

This requires from future managers of Pakistan to be more innovative, more effective, more intelligent, more enterprising and confident to face the globe with excellent leadership qualities. This is what the message and the moral of the dialogue is from Mr. Abdul Hakim Chishti, (Chartered Accountant and Quality Manager).

Lesson # 38

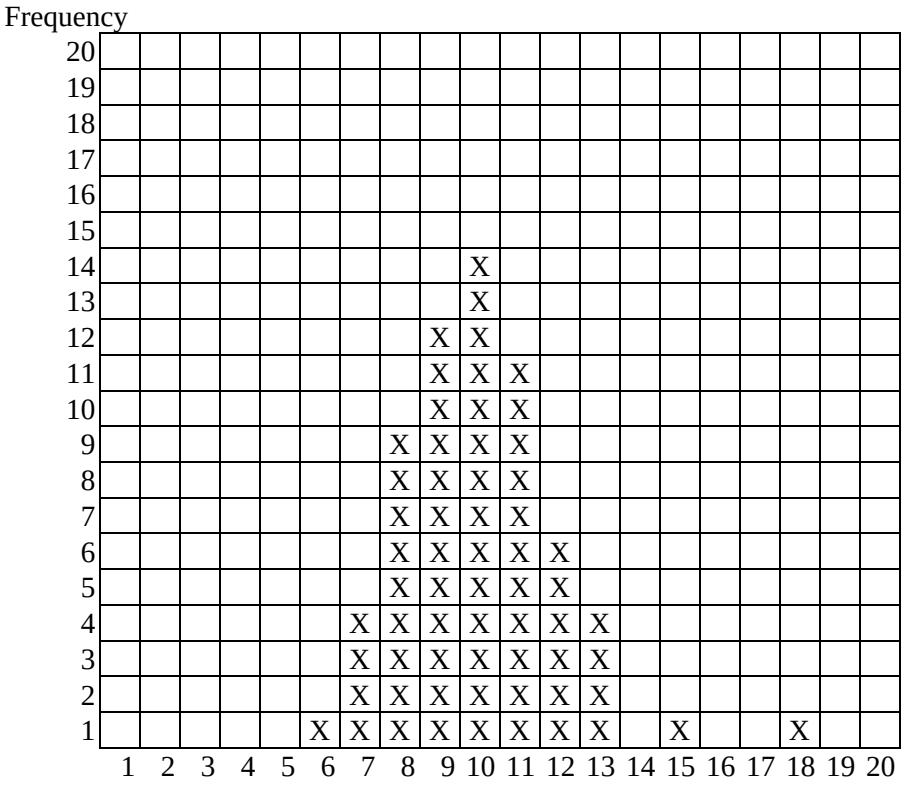
CAUSE AND EFFECT DIAGRAM AND OTHER TOOLS OF QUALITY

Histograms

Variation in a process always exists and generally displays a pattern that can be captured in a histogram. A histogram is a graphical representation of the variation in a set of data. It shows the frequency or number of observations of a particular value or within a specified group.

Histograms provide clues about the characteristics of the population from which a sample is taken. Using a histogram, the shape of the distribution can be seen clearly, and inferences can be made about the population. Patterns can be seen that would be difficult to see in an ordinary table of numbers. The check sheet below was designed to provide the visual appeal of a histogram as the data are tallied. It is easy to see how the output of the process varies and what proportion of output falls outside of any specification limits.

Example of a Check Sheet for Variable Data



Time to process loan request (days)

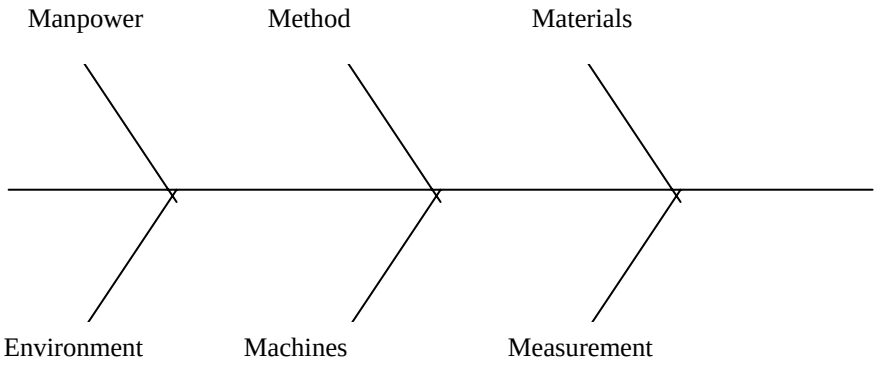
Cause-and-Effect Diagrams

The most useful tool for identifying the causes of problems is a cause-and-effect diagram, also known as a fishbone or Ishikawa diagram, named after the Japanese quality expert who popularized the concept. A cause-and-effect diagram is simply a graphical representation of an outline that presents a chain of causes and effects. A team typically uses a cause-and-effect diagram to identify and isolate causes of a problem. The technique was developed by the late Dr. Kaoru Ishikawa, a noted Japanese quality expert.

An example is shown in figure below. At the end of the horizontal line is the problem to be addressed. Each branch pointing into the main stem represents a possible cause. Branches printing to the causes are contributors to these causes. The diagram is sued to identity the most likely causes of a problem so that further data collection and analysis can be carried out.

IDENTIFYING CAUSES

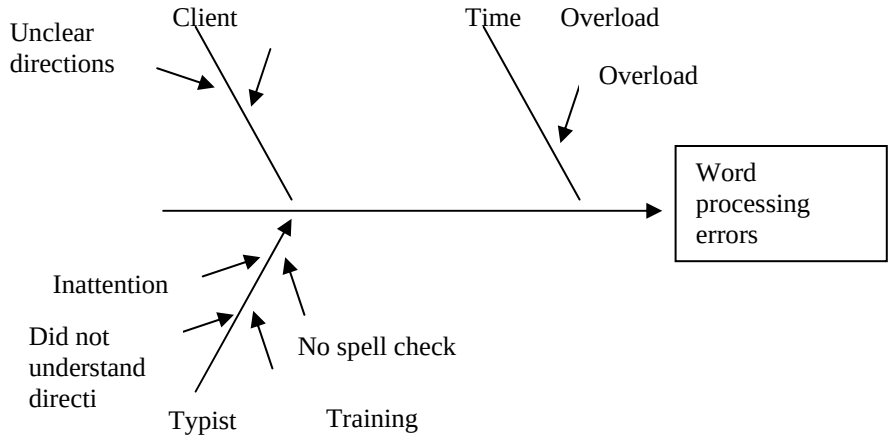
Identifying causes is a critical step in the process. It involves the pairing off of causes and effects. Effects are the problems that have already been identified. Say that one such problem has been targeted for solving. A fishbone diagram has six spines and represents the six major groupings of causes: manpower (personnel). Method,



Sample Cause-and-Effect Diagram

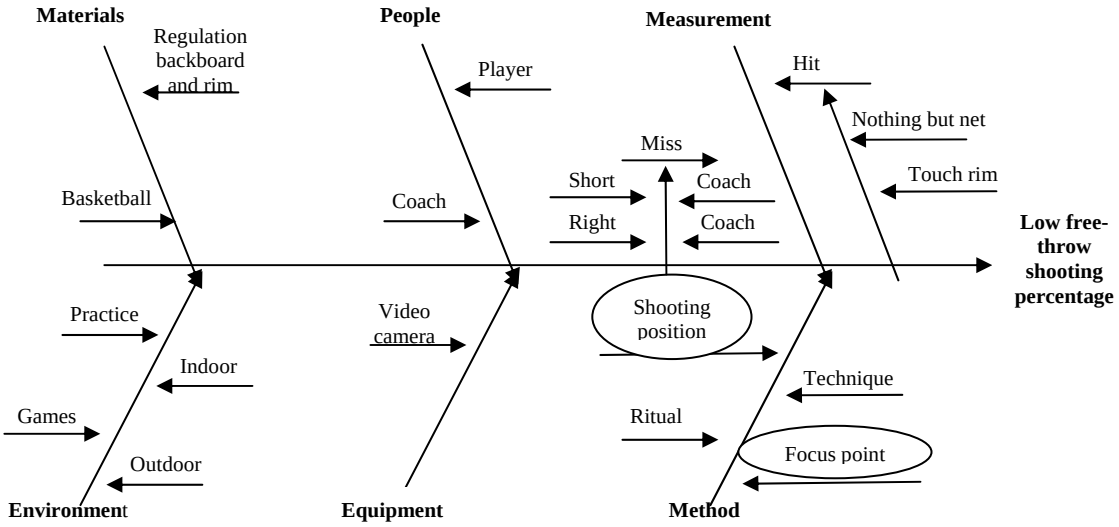
Materials, machines (equipment), measurement, and environment. All causes of work- place problems fall into one of these major groupings. Using the diagram, team members' brainstorm causes under each grouping. For example, under the machine grouping, a cause might be insufficient maintenance. Under the manpower grouping, a cause might be insufficient training.

A Cause-and-Effect Diagram



Cause-and-effect diagrams are usually constructed in a brainstorming setting so that everyone can contribute their ideas. Usually small groups drawn from operations or management work with an experienced facilitator. The facilitator guides the discussion to focus attention on the problem and its causes, on facts, not opinions. This method requires significant interaction among group members. The facilitator must listen carefully to the participants and capture the important ideas.

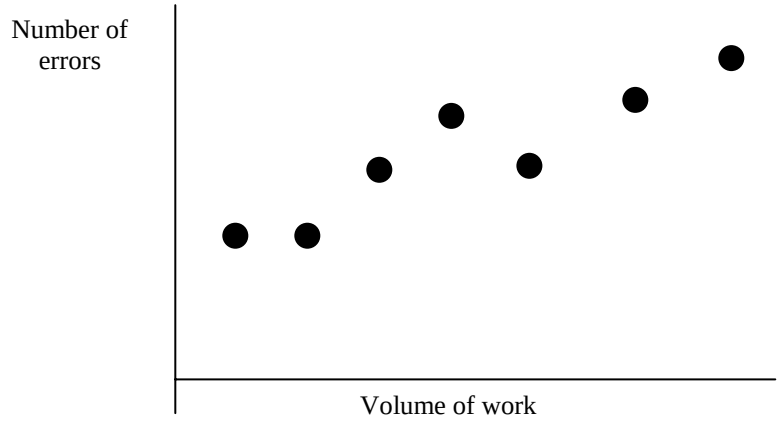
Free-Throwing Cause-And-Effect Diagram



Scatter Diagram

Scatter diagrams illustrate relationships between variables, such as the percentage of an ingredient in an alloy and the hardness of the alloy, or the number of employee errors and overtime worked (Figure 3.12). Typically the variables represent possible causes and an effect obtained from cause-and-effect diagrams.A general trend of the points going up and to the right indicates that an increase in one variable corresponds to an increase in the other. If the trend is down and to the right, an increase in one variable corresponds to a decrease in the other. If no trend can be seen, then it would appear that the variables are not related. Of course, any correspondence does not necessarily imply that a change in one variable causes a change in the other. Both may be the result of something else. However, if there is reason to believe causation, the scatter diagram may provide clues on how to improve the process.

Scatter Diagram



Control Charts

These tools are the backbone of statistical process control (SPC), and were first proposed by Walter Shewhart in 1924. Shewhart was the first to distinguish between common causes and special causes in process variation. He developed the control chart to identify the effects of special causes. Much of the Deming philosophy is based on the use of control charts to understand variation.

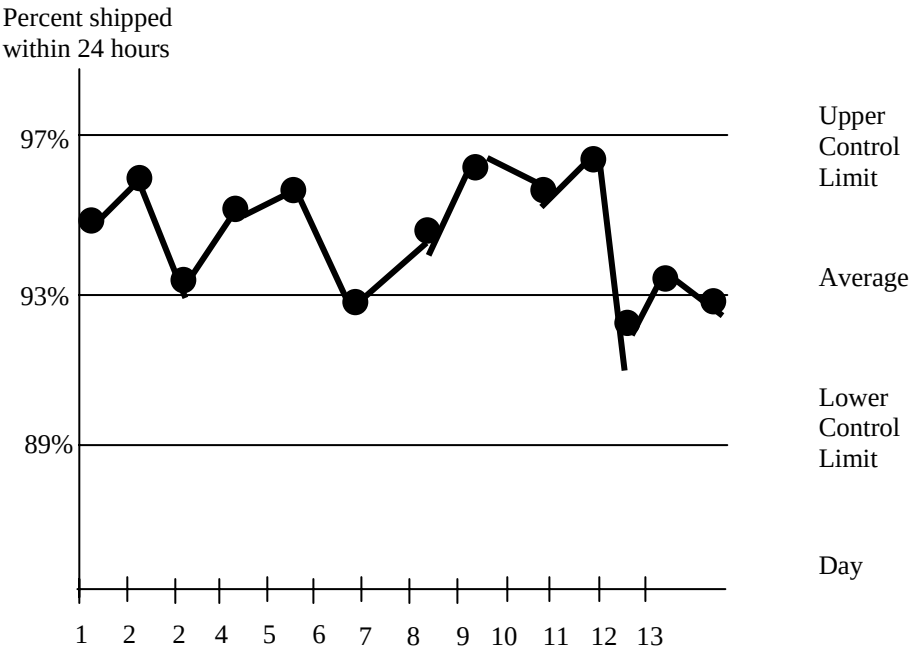
A control chart displays the state of control of a process. Time is measured on the horizontal axis, and the value of a variable on the vertical axis. A central horizontal line usually corresponds to the average value of the quality characteristic being measured. Two other horizontal lines represent the upper and lower control limits, chosen so that there is a high probability that sample values will fall within these limits if the process is under control – that is, affected only by common causes of variation. If points fall outside of the control limits or if unusual patterns such as shifts up or down, trends up or down, cycles, and so forth exist, special causes may be present.

Two fundamental mistakes that can be made concerning variation are

1. Treating special causes as common causes, and
2. Treating common causes as special causes.

Control charts minimize the risk of making these two types of mistakes. As a problem-solving tool, they allow workers to identify quality problems as they occur and base their conclusions on hard facts.

EXAMPLE OF A CONTROL CHART



Lesson # 39

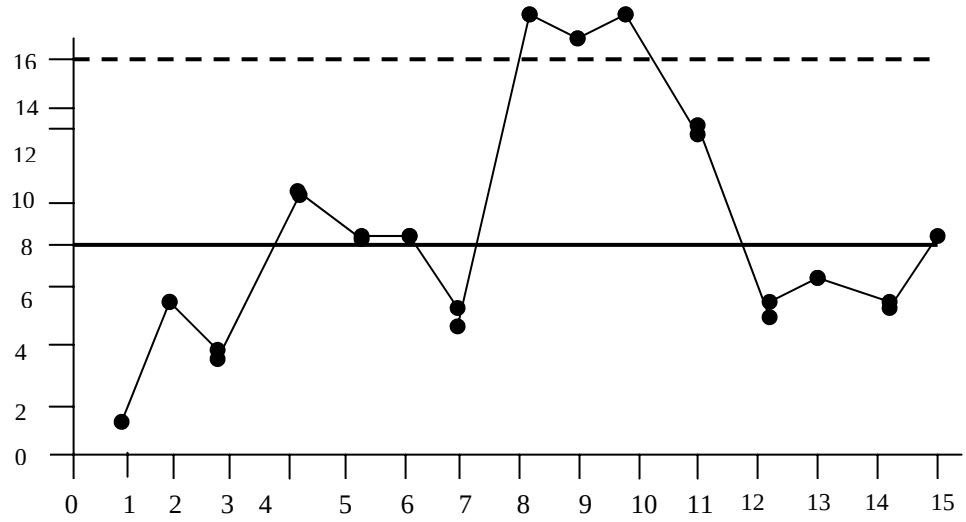
STATISTICAL PROCESS CONTROL (SPC) FOR CONTINUAL QUALITY IMPROVEMENT

Variation and Process Control

In a total quality setting, consistency and predictability are important. When a process runs consistently, efforts can begin to improve it by reducing process variations, of which there are two kinds:

- Common-cause variation is the result of the sum of numerous small sources of natural variation that are always part of the process.
- Special-cause variation is the result of factors that are not part of the process and that occur only in special circumstances, such as a shipment of faulty raw material or the involvement of anew, untrained operator.

The performance of a process that operates consistently can be recorded and plotted on a control chart such as the one in Figure below. The sources of the variation in this figure that fall within the control limits are likely to be common causes. The sources of variation in this figure that fall outside the control limits are likely to be special-causes sources. In making decisions about the process in question, it is important to separate common and special causes of variation.



Control Chart

If you react to common-cause variation as if it were due to special causes, you will only make matters worse and increase variation, defects, and mistakes. If you fail to notice the appearance of a special cause, you will miss an opportunity to search out and eliminate a source of problems

Control charting in SPC utilizes in-process (sometimes called on-line) sampling techniques to help monitor a process. The purpose is to indicate when the process is functioning as intended i.e. statistically under control and when to take corrective action of some type is necessary. Hence SPC can be taken as a proactive and preventive approach of quality improvement. An in-control process is considered stable and out-of-control process is said to be un-stable. Improvement in stable system can occur only through system changes, which are the responsibility of management and empowered employees. Instability is created when a special cause or disturbance is present. Once an indication of a process shift is detected it is up to the operators, engineers, and other technical people to locate the special cause/s and take corrective action.

Lecture # 40

STATISTICAL PROCESS CONTROL….CONTD.

SPC learning through examples:

Example # 1 Shooting for Quality:

Mr. Khan observed that in basketball games, his son Ali's free throw percentage averaged between 45 and 50 percent.
Ali's process was simple: Go to the free throw line, bounce the ball four times, aim, and shoot.
To confirm these observations, Ali shot five sets of 10 free throws with an average of 42 percent, showing little variation among the five sets.
Mr. Khan developed a Cause-and-Effect Diagram to identify the principal cause/s.
After analyzing the diagram and observing his son's process, he believed that the main cause was not standing in the same place on the free-throw line every time and having an inconsistent focal point.
They developed a new process in which Ali stood at the centre of the line and focused on the middle of the front part of the rim. The new process resulted in a 36 percent improvement in practice.
Toward the end of the 2004 season, he improved his average to 69 percent in the last three games.
During the 2005 season, Ali averaged 60 percent.
A control chart showed that the process was quite stable.
In the end of 2005, Ali attended a basketball camp where he was advised to change his shooting technique. This process reduced his shooting percentage during the 2006 season to 50 percent.
However, his father helped him to reinstall his old process, and his percentage returned to its former level, also improving his confidence SP charting followed by drawing a fishbone helped to find the special cause of variation and corrected it improved the performance and hence making playing process under control limits.

Variation in the Outputs is a function of the variation in the Inputs
$Y = f(X)$
This idea provides some initial guidance for breaking down and understanding sources of variation. Changes in desired characteristics of the output are a direct result of changes or variation within inputs to that process. If there are inherent flaws or shortcomings within the process, they will result in variation in the outputs of the process. We examine all variation within the important input parameters in order to determine which factor plays the greatest role on variation within the output.
There is a distinct difference between the inherent failures of the system which are random. We will describe these as common cause based on the fact that we can predict the general area of the outcomes. However, these types of errors are very different than special cause problems which we can tie into specific events of conditions. These errors are special cause problems.

Variation in Product (Y) = Function of Process (X) or (Variation in Process)

$Y = f(X)$

How do we find Variation?

- **Typically we collect data and use basic TQ tools to view it:**
  - Run chart
  - Histogram
  - Pareto …….OR
- **We can also summarize this data using more advanced statistical methods:**
  - Averages of smaller groups
  - Ranges, or dispersions, within these groups ……. and
- **By combining summary statistics like averages and ranges with Run Charts to create a very powerful tool -----**

Control Charts

Control charts examine information and data typically already collected as a metric or measurement of process output. We will examine averages and the differences in groups over a period of time in order to determine what is normal, what is expected, and what is predictable.
Here are some questions that might start the process: How do we currently analyze the problem area? Could we make more effective use of control charts to learn about the process by looking at the same information? Can we make the same pieces of data tell us more about the problem than they currently do? In short, are we getting our money's worth out of our current analysis?
We are motivated to improve the outputs of the process. The big Y's However, we know that variation in the outputs is a function of the variation in the inputs. As a result, we are draw to focus on these outputs. This often causes us to concentrate solely on the changes in the outputs without looking at the changes in the inputs and "adjusting" the process to manipulate the output instead of making real improvements. We concentrate primarily on the goals and not on how the system can truly perform. If we instead examine where we expect to perform and driven changes to support where we want the process to develop, the end result is improvement in the output.
When currently measure our process performance according to some standard. How will we quantify improvement? How will we know when we are done? Are we operating within our normally expected process limits? How do these relate to our specification limits? How do we measure the voice of the customer compared to the voice of the process? These are important questions to ask and answer.

Special vs. Common Causes:

There are distinct differences between actions designed to eliminate special cause and common cause variation:

- Special cause action eliminates a specific isolated event; does not involve a major process change
- Common cause action makes a change in the process that results in a measurable change in the normal process performance

Common cause variation is inherent to the system. It is the normal variation built into the process. There is a distinct difference between the inherent failures of the system and those caused by specific assignable events. We will describe these as common cause based on the fact that we can predict the general area of the outcomes. However, these types of errors are very different than special cause problems which we can tie into specific assignable events. These errors are special cause problems.
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Lesson # 41

BUILDING QUALITY THROUGH SPC

Statistical Process Control

- Capable processes also must be *controlled*
- SPC distinguishes 2 types of variability
  - Normal (Random) Variability
  - Abnormal (Structural) Variability

SPC requires the use of Statistics

- Quality improvement efforts have their foundation in statistics.
- Statistical Process Control involves the
  - Collection
  - Tabulation
  - Analysis
  - Interpretation
  - Presentation

Of numerical data.

Types of Data

- **Variables** Data - quality characteristics that are measurable values.
  - Measurable and normally continuous; may take on any value.
- **Attribute** Data - quality characteristics that are observed to be either present or absent, conforming or nonconforming.
  - Countable and normally discrete;

Control Chart Functions

1. Control Charts are Decision-Making Tools - they provide an economic basis for deciding whether to alter a process or leave it alone
2. Control Charts are Problem-Solving Tools - they provide a basis on which to formulate improvement actions
3. SPC exposes Problems; it does not solve them!

- To monitor Output, we use a control chart
  - we check things like the mean, range, standard deviation
- To monitor a Process, we typically use pair of control charts
  - mean (or some other central tendency measure)
  - variation (typically using range or standard deviation)
- Separate common and special causes of variation
- Determine whether a process is in a state of statistical control or out-of-control
- Estimate the process parameters (mean, variation) and assess the performance of a process or its capability

Commonly Used Control Charts

- Variables data
  - x-bar and R-charts
  - x-bar and s-charts

  - Charts for individuals (x-charts)
- Attribute data
  - For “defectives” (p-chart, np-chart)
  - For “defects” (c-chart, u-chart)

Defining Process Capability

- Process capability refers to the ability of the process to meet the specifications set by the customer or designer.

Lesson # 42

AN INTERVIEW SESSION WITH OFFICERS OF A CMMI LEVEL 5 QUALITY IT PAKISTANI COMPANY

In this session you will meet the CEO of a Pakistani IT company. He will share how the policy decision was taken to move on the journey of quality in the software development process. It took several years of time, dedicated efforts of the team and leadership commitment along with financial investment. As you will hear, they were confident of their return on the investment in improvement of quality of their products and greater satisfaction of their customers with a confidence that they can do better and better and Pakistani managers/engineers are no less than any other country when it comes to making it possible.

You will also hear in this session from head of HR that to meet the challenges of the commercial international market, internal competency market of staff has to be aligned and continually updated to stay ahead of your competition. This was one of the reasons to join the band wagon of highest level of quality in the global market.

Lesson # 43

TEAMWORK CULTURE FOR TQM

The Importance of Teams in TQ

Teams are everywhere in TQ organizations: at the top and bottom and in ever function and department in between. Why are there so many teams? The TQ philosophy recognizes the interdependence of various parts of the organization and uses teams as a way to coordinate work. Teamwork enables various parts of the organization work together in meeting customer needs that can seldom be fulfilled by employees limited to one specialty. Teams promote equality among individuals, encouraging a positive attitude and trust. The diversity inherent in tams often provides unique perspective on work, spontaneous thought, and creativity. In addition, teams develop a greater sense of responsibility for achieving goals and performing tasks. In short, teams provide a variety of benefits that are not derived from individuals working alone.TQ organizations recognize that the potential contributions of employees are much greater than in the traditional organization, an teams are an attempt to take advantage this potential. Further, the competitive environment of modern business requires flexible, fast reaction to changes in customer demands or technological capacity. Teams can provide the capacity for rapid response.

Types of TQ Teams

TQ uses so many different types of teams that sometimes it is difficult to tell one from another. Some common types of teams include:

- Steering committees (or quality councils) – management teams that lead an organization and provide direction and focus.
- Problem-solving teams – teams of workers and supervisors that met to address workplace problems involving quality and productivity, or ad-hoc teams with a specific mission such as organizational design teams that act a architects of change as discussed in the previous chapter.
- Natural work teams – people who work together every day to perform a complete unit of work.
- Self-managed teams – Work teams that are empowered to make and control their own decisions.
- Virtual teams – teams whose member communicate by computer, take turns as leaders, and jump in an out as necessary. Virtual teams are beginning to play an increasingly important role because of the Internet and electronic communication.

Steering Committees

Most organizations practicing total quality have a steering committee, called a quality council by Juran and a quality improvement team by Crosby. Steering committees are responsible for establishing policy for TQ and for guiding the implementation and evolution f TQ throughout the organization. The top manager of the organization is usually on the steering committee, as is the manager with overall responsibility for quality- for example, the Vice President /Director of Total quality. The steering committee may meet fairly often when a TQ effort is getting started, but usually meets only monthly or quarterly once things are under way. This group makes key decisions about the quality process – how quality should be measured and what structures and approaches should b used to improve quality. The steering committee also periodically reviews the status of TQ and makes the adjustment necessary to ensure customer satisfaction and continuous improvement. In general, the steering committee has overall responsibility for the progress and success of the TQ effort.

Problem-Solving Teams

The second, and probably most common, type o team used in TQ is the problem-solving team. As the name implies, problem-solving teams work to improve quality by identifying and solving specific

quality-related problems facing the organization. Such teams are sometime referred to as corrective action teams, or quality circles, although many organizations have created their own names for them. Two basic types of problem-solving teams are departmental and cross-functional.

Departmental Problem-Solving Teams

These teams are limited in membership to employees of a specific department and are limited in scope to problems within that department. Such groups typically meet once a week for one to two hours and progress through a standardized problem-solving methodology. First they identify a set of problems and select one to work on. Then they collect data about the causes of the problem and determine the best approach to solving it.

If the solution does not require any major changes in procedures or substantial resources, the group frequently can implement its own solution. If this is not the case, group members will make a presentation to some level of management, requesting approval for their solution and the resources to implement it. These teams typically remain relatively intact as they address a number of problems in succession.

Cross-Functional Teams

Cross-functional teams are not unique to total quality – they are commonly used in new product development, for example – but are increasingly becoming a mainstay of quality programs. These teams are similar in many ways to the departmental teams just discussed: they receive training in problem solving, identify and solve problems, and either implement or recommended solutions.

The differences are that members of cross-functional teams come from several departments or functions, deal with problems that involve a variety of functions, and typically dissolve after the problem is solved. For example, a cross-functional team in a brokerage might deal with problems in handling questions from clients. The issues raised would not be limited to stocks, bonds, or mutual funds, so people from all of these areas would be involved.

Cross-functional teams make a great deal f sense in an organization devoted to process improvement, because most processes do not respect functional boundaries. If a process is to be comprehensively addressed, the team addressing it cannot be limited, by either membership or charter, to only one function. To be effective, cross-functional teams should include people from several departments: those who are feeling the effects of the problems, those who may be causing it, those who can provide remedies, and those who can furnish data.

Natural Work Teams

Natural work teams are organized to perform a complete unit of work, such as assembling a motorcycle, creating circuit plans for a television set, or performing a market research study from beginning to end. Te “unit of work” need not be the final product, but some intermediate component. Natural work teams replace rather than complement the traditional organizational of work. What is different in this work design structure is that work tasks are not narrowly defined as they would be on an assembly line, for instance. Team members share responsibility for completing the job and are usually cross-trained to perform all work tasks and often rotate among them.

Self-Managed Teams

Self-managed teams (SMTs), also known as self-directed teams or autonomous work groups, are natural work teams with broad responsibilities, including the responsibility to manage themselves. SMTs are empowered to take corrective action and resolve day-to-day problems; they also have direct access to information that allows them to plan, control, and improve their operations. Although self-managed teams have been used for decades, (the SMT concept was developed in Britain and Sweden in the

1950s, and one of the early companies to adopt it was Volvo, the Swedish auto manufacturer), their popularity has increased in recent years, due in part to their use in TQ. In the absence of a supervisor, SMTs often handle budgeting, scheduling, setting goals, and ordering supplies. Some teams even evaluate one another's performance and hire replacements for departing team members.

SMTs have resulted in improved quality and customer service, greater flexibility, reduced costs, faster response, simpler job classifications, increased employee commitment to the organization, and the ability to attract and retain the best people.

Virtual Teams

Virtual teams are groups of people who work closely together despite being geographically separated. Virtual teams rarely meet face-to-face; their primary interaction is through technologies such as telephone, fax, shared databases and collaborative software systems, the Internet, e-mail, and video conferencing, In 1998, over 8 million workers were members of such teams, and this number has undoubtedly grown as new technology has proliferated. Virtual teams are becoming important because of increasing globalization, flatter organizational structures, an increasing shift to knowledge work, and the need to bring diverse talents and expertise to complex projects and customize solutions to meet market demands. For example, a product design team in the United States can hand off its work to another team in Asia or Australia, resulting in an almost continuous work effort that speeds up development time considerably.

Because of their physical separation, some have difficulty applying the team concept t virtual teams. Virtual teams can face some unique challenges including language, culture, style differences, and the lack of social relationships that can lessen team commitment. These require special efforts to ensure that a team environment is truly realized, particularly paying attention to communication, strong interpersonal relationships, and formal structures that support their work.

Effective Teamwork

Teams are the main structure of many TQ organizations. Thus, effective teamwork is critical to a successful TQ effort. If teams are not effective, TQ processes will suffer. Steering committees will choose poor directions and policies for the organization; departmental and cross-functional problem-solving teams will choose inappropriate problems or won't be able to solve the problems they identify; and self-managed teams will not be able to fulfill the promise of an empowered, creative workforce.

Criteria for Team Effectiveness

There are several criteria for team effectiveness. First, the team must achieve its goals f quality improvement. For example, a steering committee must move the TQ effort ahead, a problem-solving team must identify and solve important problems, a self-managed team must operate and improve a set of production or service processes.

Second, teams that improve quality performance quickly are more effective than those that take a long period of time to do so. One of the strengths of teams is their potential for rapid adaptation to changing conditions. A team that takes a long time to accomplish anything is losing te potential benefits of having problems solved sooner and is consuming a greater-than-necessary amount of resources, including the time devoted to team meetings. In short, it is inefficient.

Third, the team must maintain r increase its strength as a unit. Think of the team as representing as asset-a quantity of human capital-beyond that represented by its individual members. This additional human capital is based on the ability t understand and adjust to one another's work styles, the development of an effective set of routines, the growth of trust among team members, and so on. A team that remains intact over a period of time preserves and enhances this human capital. A team that solves

an important problem but has such miserable relations that it dissolves, does not. It may make a contribution to the TQ effort, but it squander a considerable amount of human capital in the process.
Fourth, the team must preserve or strengthen its relationship with the rest of the organization. A team that accomplishes its goals at the cost of alienating others in the organization violates the TQ spirit of teamwork and compromises its ability to perform successfully in the future, when the collaboration of others may well be needed. Peter Scholtes, a leading authority on teams for quality improvements, has suggested 10 ingredients for a successful team:

1. **Clarity in team goals.** As a sound basis, a team agrees on a mission, purpose, and goals.
2. **An improvement plan.** A plan guides the team in determining schedules and mileposts by helping the team decide what advice, assistance, training, materials, and other resources it may need.
3. **Clearly defined roles.** All members must understand their duties and know who is responsible for what issues and tasks.
4. **Clear communication.** Team members should speak with clarity, listen actively, and share information.
5. **Beneficial team behaviors.** Teams should encourage members to use effective skills and practices to facilitate discussions and meetings.
6. **Well-defined decision procedures.** Teams should use data as the basis for decisions and learn to reach consensus on important issues.
7. **Balanced participation.** Everyone should participate, contribute their talents, and share commitment to the team's success.
8. **Established ground rules.** The group outlines acceptable and unacceptable behaviors.
9. **Awareness of group process.** Team members exhibit sensitivity to nonverbal communication, understand group dynamics, and work on group process issues.
10. **Use of the scientific approach.** With structured problem-solving processes, teams can more easily find root causes of problems.[18]

Team Processes

Many processes are undertaken within TQ teams, including quality planning, problem selection and diagnosis, communication, data collection, and implementation of solutions. Team processes are not fundamentally different from other processes, such as assembling an electronic device, taking a patient's vital signs, or preparing cop au vin. The customers of all these processes can be identified, their elements can be placed in a flowchart, steps that do not add value can be removed, and their quality can be improved continuously.

Problems Selection

One of the processes undertaken at least occasionally by most teams and frequently by problem-solving teams is the choice of problems or issues on which to work. This process can be particularly difficult for newly empowered employees, who are more accustomed to being told what to do than they are to establishing their own agenda. New teams generally are not skilled enough to solve massive problems, and a failure to address such a visible problem successfully may be difficult for the team to overcome. It makes more sense for a team initially to select a problem of moderate importance and difficulty and to move on to more complex ad difficult problems when the team is better established. This approach is more likely to lead to successful solutions, which will build momentum for each team and for the quality effort as a whole.

Problem Diagnosis

After problems to be addressed are identified, their causes must be ascertained. Thus a second critical process in TQ groups is problem diagnosis, the process by which the team investigates potential causes of problems to identify potential solutions. Juan refers to this step as the "diagnostic journey" and explains that it consists of three parts:

1. Understanding the symptoms (for example, a process out of control),
2. Theorizing as to causes (for example, preventive maintenance neglected), and
3. Testing the theories (for example, reviewing preventive maintenance records to see whether they relate to the problems experienced).

Many teams want to bypass problem diagnosis and begin problem solving as soon as possible, usually because they mistakenly believe that the problem's causes are obvious. Teams that spend more time diagnosing problems have been shown to be much more effective than those that proceed immediately to solutions.

Work Allocation

Another important process is the allocation of work within the team. Many teams approach this process haphazardly, assigning tasks to the next in line or the first person who volunteers. Assigning tasks is one of the keys to team effectiveness and should not be taken so lightly. Each team member has certain skills and will perform well on tasks that use those skills and not o well on tasks that use other skills. The team needs to assign people tasks that will utilize their skills to the greatest extent possible.

Communication

Communication is key processes for any team attempting to improve quality Steering committees communicate priorities to employees. Members of problem-solving teams communicate among themselves and to their internal and external customers. For example, problem-solving teams often have to present their recommendations to management. Self-managed teams have similar communication needs and often must communicate effectively across shifts.

Communication within and across teams can also be enhanced by suing a variety of media. Many TQ teams use electronic mail and fax machines, but also benefit from such low-tech media as posters and graphs posted on the walls. As with many team processes, any specific recommendations are less important than the general idea of recognizing communication as a process that consists of a series of steps that can be improved.

Coordination

Another key process is coordinating the team's work with other teams and departments in the organization. Team cannot work in isolation, and maintaining good relationships outside the team is one criterion of team effectiveness. New product teams, for example, depend on other parts o the organization for resources, information, and support while also acting as primary internal suppliers. Coordination often involves resolving issues of interdependent schedules, but may also include some negotiation. Thus, teams often play a "boundary spanner" role. The boundary-spanning literature shows positive relationships between communication and performance. However, researchers have often found a tendency among teams to turn inward, believing that their own needs, ideas, and plan are more valid than those of "outsider." Ironically, the more cohesive the team becomes, the greater the likelihood of this occurring.

In summary, team processes can be improved just like any other process. Several key processes that are candidates for improvement are problem identification and diagnosis, work allocation, communication, and coordination of work with other teams and departments.

Organizational Support

However skillful the team, they will find it hard to be successful unless their efforts are supported by the organization in general and by management in particular. Organizational support is the foundation for effective teamwork. Management must provide the following if a TQ team is to be successful.

First, management must issue a clear charge to the group; that is, a description of what the group is and is not expected to do. This is often called a team charter. Many teams have wasted a great deal of time and energy on issues that they later found they were not authorized t pursue. Management's guidance as to the quality priorities of the organization is crucial, especially in the early stages of a team's work. Several organizational researchers have found that team performance improved for teams with charters and clear expectations.28

Second, human resource management (HRM) systems often must be adjusted. Conventional HRM systems may be barriers to effective teamwork that will undermine TQ if not changed.29 the need for enhanced training is particularly acute, as team members must be brought up to speed on the various types of skills necessary for effective teamwork.

Performance appraisal and reward systems are also a concern. Many of these systems are designed to reward individual effort or the attainment of functional goals, rather than teamwork. Numerous research studies over the past several decades have pointed out the problems and pitfalls of performance appraisals.[30] many legitimate objections can be made:

- They tend to foster mediocrity and discourage risk taking.
- Thy focus on short-term and measurable results, thereby discouraging long-term planning or thinking and ignoring important behaviors that are more difficult to measure.
- They focus on the individual and therefore tend to discourage or destroy teamwork within and between departments.
- The process is detection-oriented rather than prevention-oriented.
- They are often unfair, since manager frequently don't possess observational accuracy.
- They fail to distinguish between factors that are within the employees' control and system-determined factors that are beyond their control.

This can greatly undermine teamwork and can be fatal t the team if not addressed.

Lesson # 44

UNDERSTANDING EMPOWERMENT FOR TQ AND CUSTOMER-SUPPLIER RELATIONSHIP

Introduction to Empowerment

Empowerment means giving someone power-granting the authority to do whatever is necessary to satisfy customers, and trusting employees to make the right choices without waiting for management approval. By empowering employees, organizations drive decision making down to its lowest possible level. Empowerment allows organizations to flatten their organizational structure because fewer managers are needed to "direct and control" employees. Many companies have found that giving people throughout the organization the power to make a difference contributes greatly to providing quality products and services to their customers. The need to empower the entire workforce in order for quality to succeed has long been recognized, even if it is only recently coming into practice. Five of Deming's 14 Points relate directly to the nation of empowerment.

Point 6: Institute training
Point 7: Teach and institute leadership
Point 8: Drive out fear. Create trust. Create a climate for innovation
Point 10: Eliminate exhortations for the workforce.
Point 13: Encourage education and self-improvement for everyone

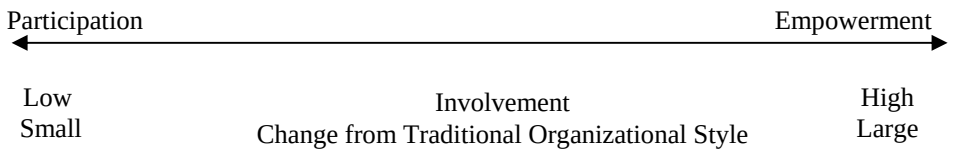
Juran wrote that "ideally, quality control should be delegated to the workforce to the maximum extent possible." Empowerment resembles Juran's concept of "self-control." For employees to practice self-control, they must know their unit's goals and their actual performance and have a means for changing performance if the goals are not being met. Although it is a difficult struggle, organizations are increasingly meeting these conditions. Empowerment is a natural extension of employee involvement concepts such as worker participation in decision making. In some companies empowerment is used as the umbrella term for increasing employee involvement in decision making. Empowerment is more than another term for involvement, however. It represents a high degree of involvement in which employees make decisions themselves and are responsible for their outcomes. This is a more radical change than having employees merely participate in managers' decisions, even when they are given some influence.

For empowerment to occur, managers must undertake tow major initiatives:

- Identify and change organizational conditions that make people powerless, and
- Increase people's confidence that their efforts to accomplish something important will be successful.

The need to do both of these implies that organizational system often creates powerless employees and that these systems must be changed first. Examples of systems in need of change are those that specify who can (and cannot) make certain types of decisions and systems of standard operating procedures (and who can override them).

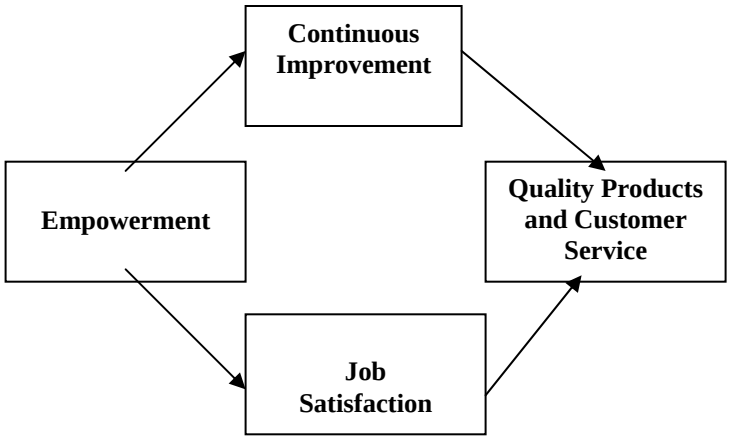
Continuum of Employee Involvement Practices



Even when systems are changed to permit empowerment, individuals who have lived under those systems are not readily able to operate in an empowered manner. The other need for empowering people is to deal with the psychological aftereffects of powerlessness by convincing people that they are in fact able to "make a difference."

Empowerment is an application of the teamwork principle of total quality, embodying "vertical" teamwork between managerial and non managerial personnel. If employees are given important responsibilities – and the authority that goes along with them – it is more realistic to describe their relationship with management as teamwork than it would be in hierarchical system. After all, people can hardly be seen as team members if they only execute decisions made by others.

How Empowerment Leads To Quality



Everyone in organizations is an asset, albeit an asset whose value is not automatically realized. If money is put into a closet instead of a bank, it will not gain interest. Employees who are put into jobs that are like being in a closet (in the dark, isolated) similarly will not provide value to the organization. Giving employees responsibility for their own work has led not only to improvements in motivation, customer service, and morale, but also to improvements in quality, productivity, and the speed of decision making.

Principles of Empowerment

Although many organizations have undertaken the journey toward empowerment, many have become lost along the way. Semi empowerment just doesn't work. Senior managers need to ask three critical questions:

1. How can I make fewer decisions, thereby letting others become more involved in managing the business?
2. How can teach others how to make solid decisions once they're given the chance?
3. How can I recruit others to be more aware of changes that need to be made in order to keep our company competitive – and then help them feel they can make these changes without begging for permission each and every time?

This does not mean that there should be no limits. On the contrary, managers must be clear on exactly what responsibility and authority rests with employees. Questions such as "What procedures can we change?" and "how much money can we commit?" must be answered ahead of time. Finally, managers must be willing to wait for results, as miracles do not happen overnight.

Establishment Mutual Trust

As Juran has put it, "The managers must trust the workforce enough to be willing to make the delegation, and the workforce must have enough confidence in the managers to be willing to accept the responsibility." Trust is not created just by saying you trust someone; it must be backed up by actions.

Provide Employees wit Business Information

For empowerment to succeed, it must focus on making the organization more competitive. Empowerment can contribute to organizational performance only if employees have access to the necessary information about the business and its performance, such as their personnel files and resources such as the quality improvement budget. Information about the employees' department or other subunit is particularly necessary, as this is the level of performance that they can affect. Sharing business information with employees relates directly to quality, customer service, and competitiveness.

In the absence of appropriate information, empowered employees may squander their power on problems that are not very important. As Peter Senge has put it, "empowering the individual where there is a relatively low level of alignment [between organizational and employee goals] worsens the chaos and makes managing . . . even more difficult."Te criticism of misplaced goals was often leveled at earlier employee-involvement efforts, such as quality circles. Although managers formerly blamed employees for having the wrong priorities, sophisticated managers today recognize that they are responsible for providing employees with the information necessary to develop educated priorities.

Ensure That Employees Are Capable

"You can't empower incompetence," says one manager. If employees are going to take on important organizational responsibilities, they must be prepared t do so. To operate in an empowered, TQ environment, employees must possess not only technical skills (including statistics) but also interpersonal and problem-solving skills. Unfortunately, many people entering the workforce today lack even the most basic skills in reading and math, let alone these relatively advanced skills.

Employee capability can be ensured through selection and training processes. Unless the human resource processes are adapted to provide capable employees, empowerment cannot succeed, and management's worst nightmares will be realized. Unfortunately, many employees are not trained in these areas, which helps explain the mixed results many organizations have had with empowerment. Empowerment also requires that employees understand their appropriate limits of discretion.

Don't Ignore Middle Management

A well-known principle of organization theory popularized by Deming is that organizations are systems. When changing one part of an organization, it is necessary to consider the effects of the change on other parts of the system. Thus, managers must consider how empowering lower-level employees will affect middle managers. If the needs and expectations of middle manager are ignored, empowerment will be confusing at best and disastrous at worst. Among the roles for middle managers in organizations with empowered workforces are

- Maintaining focus on the organization's values,
- Managing solutions to system-level problems (those that involve many functions and departments), and
- Acting as teachers and coaches.

It's tempting to think of middle managers faced with empowerment efforts as dinosaurs, rapidly becoming extinct because the world has changed too quickly for them. However, remember that most middle managers are a product of their organizations and have attained their level of success in an

environment that rewarded different things than are needed from managers now. Given a new set of instructions from top management, backed up by new performance appraisal criteria. Many (but far from al) managers will be able to make the necessary transition.

Change the Reward System

Rarely can substantial organizational change be created without changing the reward system. When organizations ask employees to assume new challenges and responsibilities, the question "What's init for me?" ultimately gets asked. The reward system includes all of the rewards that employees receive, as well as the criteria for distributing these rewards. An organization is to its reward system like a boat is to its anchor: unless the reward system is changed, the organization may drift a little bit in one direction or another, but it won't get very far.

It is hard to specify exactly what kind of reward systems will be needed to complement empowerment. Some of the practices common to organizations utilizing employee involvement include pay-for-skills, in which employees' pay increases as they learn new job-relevant skills, and profit sharing, in which employees receive bonuses related to the profits of their organization.

Quality in Customer-Supplier Relationships

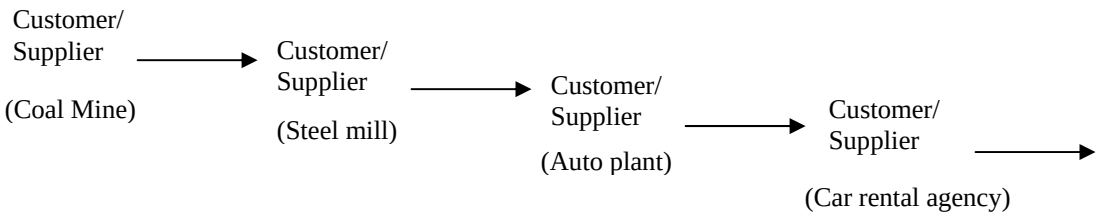
Businesses have recognized that supply chain management is crucial for effective operations and meeting customer needs. A supply chain includes the materials and other inputs purchased from suppliers, their use in the production of goods and services, and distribution and service to customers. Quality should start with the customer, and extend back through the supply chain to the root sources of procurement.

Customer-Supplier Relationship and Total Quality

From the TQ perspective, every company is part of a long chain (actually many long chains) of customers and suppliers. Each company is a customer to its suppliers and a supplier to its customers, so it does not make sense to think of a company as only one or the other. One implication of this concept is that your customer's customers are, in a sense, your customers as well. Sometimes a company must focus on both their immediate customers and those next in the chain. Procter & Gamble, for example, works hard to satisfy the needs of both the people who use their products and the retail establishments that sell them, labeling the former "consumers" and the latter "customers."

Companies should try to establish the same kinds of productive relationships with their suppliers that they have with their customers. By developing partnerships, customers and suppliers can build relationships that will help them satisfy their shared customers further along the customer-supplier chain. The idea of creating mutually beneficial relationships with both customers and suppliers is a major departure from the traditional approach to customer and supplier relationships (CSRs).

The Customer-Supplier Chain



Lesson # 45

CSR, INNOVATION, KNOWLEDGE MANAGEMENT AND INTRODUCING LEARNING ORGANIZATION

The Importance of Customers in CSR:

The importance of customers has evolved over the years, from a view of the customer as a buyer to increase profitability, to a view of the customer as an active partner and the focus of all quality activities. Customer satisfaction translates directly into increased profits. However, while satisfaction is important, modern firms need to look further. Achieving strong profitability and market share requires loyal customers-those who stay with a company and make positive referrals. Poor-quality products and services, on the other hand, lead to customer dissatisfaction in the form of complaints, returns, and unfavorable word-of-mouth publicity. Dissatisfied customers purchase from competitors. One study found that customers are five times more likely to switch because of perceived service problems than for price concerns or product quality issues. Studies have also shown that dissatisfied customers tell at least twice as many friends about bad experiences than they tell about good ones. For many companies, "The Customer Comes First" is a guiding principle. It is impossible to overstate the importance of customers to TQ. Customers are at the very center of every TQ activity, and devotion to satisfying them is the first principle of TQ. Customers are recognized as the guarantee of the organization's continued existence. Therefore, a focus on customers, rather than internal issues, is the foundation of the TQ approach to management.

The Importance of Suppliers

The quality of goods and services received from suppliers, the upstream potion of the supply chain, has a significant effect on the quality of goods and services that downstream customers receive. Suppliers are those companies that provide the organization with goods and services that help them to satisfy the needs of their own customers. A manufacturing company assembling parts made by suppliers illustrates this point: the final product cannot be any better than the parts that comprise it. If a supplier's performance is of consistently high quality; its customer can decrease or eliminate costly incoming inspections that add no value to the product. For these reasons, many organizations have increasingly demanded tangible progress in quality from all their suppliers. Companies that do not accept this requirement are dropped from supplier lists. The importance of suppliers is at least as great when they provide training, software, or other goods or services that do not physically become part of the final product; they will influence its quality nevertheless by shaping the quality of the processes used to produce it. In business today, operations are often highly decentralized and dispersed around the world. Consequently, managing a complex network of suppliers becomes a critical inter organizational issue. Suppliers play a vital role throughout the product development process, from design through distribution. Suppliers can provide technology or production processes not internally available, early design advice, and increased capacity, which can result in lower costs, faster time-to-market, and improved quality for their customers. In turn, they are assured of stable and long-term business.

Principles for Customer-Supplier Relationships

Three governing principles describe CSRs under total quality:

- Recognition of the strategic importance of customers and suppliers,
- Development of win-win relationships between customers and suppliers, and
- Establishing relationships based on trust..

Customer must be at the center of the organizational universe. Satisfying their needs leads to repeat business and positive referrals, as opposed to one-shot business and negative referrals. Suppliers must also be considered crucial to organizational success, because they make it possible to create customer

satisfaction. Neither the quality nor the cost of the organization's product can be brought to competitive levels and continuously improved without the contributions of suppliers.

The second principle of customer-supplier relationships is the need to develop mutually beneficial (often called win-win) relationships between customers and suppliers. This was discussed previously as working together to increase the size of the pie, rather than competing over how to divide it. The goal of building partnerships with customers and suppliers can be seen as an extension of the teamwork principle that applies to all TQ activities and as recognition that the needs of both partners must be satisfied if productive long-term relationships are to be created.

The third principle of effective CSRs is that they must be based on trust rather than suspicion. Aside from the obvious teamwork implications for relationships based on trust versus suspicion, monitoring supplier or customer behavior does not add any value to the product. If a trusting relationship between customers and suppliers can be developed so that neither must check up on the behavior of the other, the costs of monitoring, such as inspection and auditing, can be avoided. Many Japanese firms do not inspect items purchased from other companies in Japan; they do, however, often inspect those purchased from America.

Practices for Dealing with Customers

How can these principles be translated into specific practices? The most basic practices for dealing with customers are (1) to collect information constantly on customer expectations, (2) to disseminate this information widely within the organization, and (3) to use this information to design, produce, and deliver the organization's products and services.

Collect Customer Information

Acquiring customer information is critical to understanding customer needs and identifying opportunities for improvement. The Japanese auto industry is known for trying to understand customer needs so thoroughly that it can incorporate design features that customers would never have asked for but love once they experience them. Teams of automobile designers visit people at home and observe how they live in order to anticipate their automotive needs.

- Perhaps one of the best examples of understanding customer needs and using this information to improve competitiveness is XYZ chicken business. XYZ Company learned what customers' key purchase criteria were; these included a yellow bird, high meat-to-bone ration, no pinfeathers, freshness, availability, and brand image. He also determined the relative importance of each criterion, and how well the company and its competitors were meting, each of them. By systematically improving his ability to exceed customers' expectations relative to the competition, XYZ gained market share even though his chickens were premium-priced.

In trying to understand customer needs, it is important to go beyond what customers say the need and anticipate what will really excite them. It is a well-known principle of innovation that customers will seldom express enthusiasm for a product that is different from anything they have experienced. Some of the most popular ways to collect information about customers are surveys, service evaluation cards, focus groups, and listening to what customers say during business transactions, especially when they complain. Getting employees involved in collecting customer information improves worker skills and learning, makes work more meaningful, and enhances motivation.

Disseminate Customer Information

After people in the organization have gathered information about customer needs, the next step is to broadcast this information within the organization. After all, if the people in the firm are going to work as a team to meet customer expectations, they must all be "signing from the same hymnbook," as the saying goes. Information does little good if it stays with the person or department that brought it into the

organization. Customer information must be translated into the features of the organization's products and services. This is the bottom line of quality customer-supplier relations from the supplier's point of view: giving the customers what they want. Translating customer needs into product features can be done in a structured manner using quality function deployment (QFD).

Use Customer Information

Customer information is worthless unless it is used. Customer feedback should be integrated into continuous improvement activities.

Manage Customer Relationships

A company builds customer loyalty by developing trust and effectively managing the interactions and relationships with customers through customer-contact employees. Truly excellent companies foster close and total relationships with customers. These companies also provide easy access to their employee.

Practices for Dealing with Suppliers

In business today, operations are often highly decentralized and dispersed around the world. Consequently, managing a complex network of suppliers becomes a critical inter-organizational issue. Suppliers play a vital role throughout the product development process, from design through distribution. Suppliers can provide technology or production processes not internally available, early design advice, and increased capacity, which can result in lower costs, faster time-to-market, and improved quality for their customers. In turn, they are assured of stable a long-term business.

Successful suppliers have a culture where employees and managers share in customers' goals, commitments, and risks to promote such long-term relationships (recall one of Deming's 14 Points about supplier relationships–not purchasing solely on the basis of price). Strong customer / supplier relationships are based on three guiding principles:

1. recognizing the strategic importance of suppliers in accomplishing business objectives, particularly minimizing the total cost of ownership,
2. developing win-win relationships through partnerships rather than as adversaries, and
3. establishing trust through openness and honesty, thus leading to mutual advantages

Although the principles of CSRs are the same in dealing with supplier as they are with customers, the practices are somewhat different. In many companies, suppliers are treated as if they were actually a part of the organization. For example, functions such as cafeteria service, mailroom operations, and information processing are being performed by suppliers at their customers' facilities. As more and more of this type of outsourcing is done, the lines between the customer and the supplier become increasingly blurred.

Creativity and Innovation

Creativity is the ability to discover useful new relationships or ideas; innovation refers to the practical implementation of such ideas. Research studies have suggested that the achievement of business excellence requires a change-oriented environment where creativity of employees is nurtured, developed, and sustained.[10]

From the perspective of total quality, creativity and innovation are needed to better respond to customer needs, particularly the "exciters / delighters" that customers cannot articulate, and to develop the products and services that will position an organization strategically ahead of its competitors. Thus, creativity and innovation are instrumental in achieving the principles of total quality.

Concepts of Knowledge Management:

Knowledge is the human capacity (Potential and Ability) to take effective decisions and action in varied and uncertain conditions. Knowledge carried and possessed by a human being is of two types namely, Explicit and Tacit. Knowledge Management involves transforming data into information and the acquisition or creation or sharing of knowledge. The creation of knowledge from information requires human intervention, and applying wisdom is strictly a human function.

With the change from silo/functional thinking to enterprise/system thinking, organizations of 21st century are realizing the collective values of the knowledge bases (both tacit and explicit) i.e. their intellectual capital. It is being realized that knowledge can provide leverage to gain competitive advantage in the net based market place.

The Learning Organization:

As individuals must continue to learn, so must organizations. Prof. Peter Senge of MIT portrays organizational learning as going beyond the mere capture of knowledge to include gaining a deeper and complete understanding of how things work, and involve five learning disciplines:

1. Personal Mastery---a continual drive for personal and organizational development
2. Mental Models---understanding how our cognitive schema affect our view of the world, and continually improving the accuracy of the model
3. Shared Vision---working jointly toward a common view to which all aspire
4. Team Learning---the use of dialogue to move beyond mere conversation to true joint understanding
5. Systems Thinking---understanding the multiple cause-and-effect relationships and how they are interconnected in organizations, society and other systems.