

Pearson New International Edition

**Quality Management for Organizational  
Excellence: Introduction to Total Quality  
David L. Goetsch Stanley Davis  
Seventh Edition**



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PEARSON

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# THE TOTAL QUALITY APPROACH TO QUALITY MANAGEMENT: ACHIEVING ORGANIZATIONAL EXCELLENCE

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

## MAJOR TOPICS

- What Is Quality?
- The Total Quality Approach Defined
- Two Views of Quality
- Key Elements of Total Quality
- Total Quality Pioneers
- Keys to Total Quality Success
- The Future of Quality Management in the Twenty-First Century
- Quality Certifications

The total quality concept as an approach to doing business began to gain wide acceptance in the United States in the late 1980s and early 1990s. However, individual elements of the concept—such as the use of statistical data, Six Sigma, Lean, 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*. This chapter provides an overview of that concept, laying a foundation for study.

## WHAT IS QUALITY?

To understand total quality, we must first understand *quality*. Customers that are 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 we are 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 marketplace. 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 or atmosphere
- Price
- Selection

This 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 of people and the quality of processes.

Quality has been defined in a number of different ways by a number of different people and organizations. Consider the following definitions:

- Fred Smith, CEO of Federal Express, defines quality as “performance to the standard expected by the customer.”<sup>1</sup>
- The General Services Administration (GSA) defines quality as “meeting the customer’s needs the first time and every time.”<sup>2</sup>

- Boeing defines quality as “providing our customers with products and services that consistently meet their needs and expectations.”<sup>3</sup>
- The U.S. Department of Defense (DOD) defines quality as “doing the right thing right the first time, always striving for improvement, and always satisfying the customer.”<sup>4</sup>

In his landmark book *Out of the Crisis*, quality pioneer W. Edwards Deming has this to say about quality:

Quality can be defined only in terms of the agent. Who is the judge of quality? In the mind of the production worker, he produces quality if he can take pride in his work. Poor quality, to him, means loss of business, and perhaps of his job. Good quality, he thinks, will keep the company in business. Quality to the plant manager means to get the numbers out and to meet specifications. His job is also, whether he knows it or not, continual improvement of leadership.<sup>5</sup>

Although Deming’s landmark book is now dated, his thoughts on quality are still valid and insightful. Deming makes the point that quality has many different criteria and that these criteria change continually.<sup>6</sup> To complicate matters even further, different people value the various criteria differently. For this reason, it is important to measure consumer preferences and to remeasure them frequently. Deming gives an example of the criteria that are important to him in selecting paper:<sup>7</sup>

- It is not slick and, therefore, takes pencil or ink well.
- Writing on the back does not show through.
- It fits into a three-ring notebook.
- It is available at most stationery stores and is, therefore, easily replenished.
- It is reasonably priced.

Each of these preferences represents a variable the manufacturer can measure and use to continually improve decision making. Deming is well-known for his belief that 94% of workplace problems are caused by management and especially for his role in helping Japan rise up out of the ashes of World War II to become a major industrial power. Deming’s contributions to the quality movement are explained in greater depth later in this chapter.

Although there is no universally accepted definition of quality, enough similarity does exist among the definitions that common elements can be extracted:

- Quality involves meeting or exceeding customer expectations.
- Quality applies to products, services, people, processes, and environments.
- Quality is an ever-changing state (i.e., what is considered quality today may not be good enough to be considered quality tomorrow).

With these common elements extracted, the following definition of *quality* can be set forth:

*Quality* is a dynamic state associated with products, services, people, processes, and environments that meets or exceeds expectations and helps produce superior value.

Consider the individual elements of this definition: The *dynamic state* element speaks to the fact that what is considered quality can and often does change as time passes and circumstances are altered. For example, gas mileage is an important criterion in judging the quality of modern automobiles. However, in the days of 20-cent-per-gallon gasoline, consumers were more likely to concern themselves with horsepower, cubic inches, and acceleration rates than with gas mileage.

The *products, services, people, processes, and environments* element is critical. It makes the point that quality applies not just to the products and services provided, but also to the people and processes that provide them and the environments in which they are provided. In the short term, two competitors who focus on continual improvement might produce a product of comparable quality. But the competitor who looks beyond just the quality of the finished product and also focuses on the continual improvement of the people who produce the product, the processes they use, and the environment in which they work will win in the long run and, most frequently, in the short run. This is because quality products are produced most consistently by quality organizations.

The *superior value* element acknowledges that quality is a key element in providing superior value (i.e., superior quality, cost, and service).

## Quality, Value, and Organizational Excellence

It is important for quality professionals to understand how quality fits into the bigger picture of providing superior value to customers. Organizations survive and thrive in a globally competitive marketplace by providing superior value to customers. Achieving organizational excellence is about developing the ability to consistently provide superior value to customers over the long term. Superior value has three basic elements: superior quality, superior cost, and superior service.

### QUALITY TIP ▼

#### Ishikawa’s Definition of Quality

Any discussion of the Japanese quality gurus must include Kaoru Ishikawa. Ishikawa defines quality as follows: (1) quality and customer satisfaction are the same thing and (2) quality is a broad concept that goes beyond just product quality to also include the quality of people, processes, and every other aspect of the organization.

Source: [www.businessballs.com/](http://www.businessballs.com/) retrieved on January 15, 2011.

In order to achieve organizational excellence—the level of performance necessary for long-term success in a global environment—it is necessary to consistently provide superior value to customers. Quality is obviously one of the key elements in providing superior value. But total quality is even more than that. Total quality is a broad-based approach that encompasses all three of the elements of superior value. Continually improving the quality of products, processes, services, and costs is what total quality is all about—hence the name *total quality*. Organizations that effectively apply the total quality approach to management are the ones most likely to achieve organizational excellence.

## THE TOTAL QUALITY APPROACH DEFINED

Just as there are different definitions of *quality*, there are different definitions of *total quality*. For example, the DOD defines the total quality approach as follows:

Total quality consists of the continual improvement of people, processes, products (including services), and environments. With total quality anything and everything that affects quality is a target for continual improvement. When the total quality concept is effectively applied, the end results can include organizational excellence, superior value, and global competitiveness.

An easy way to grasp the concept of total quality is to consider the analogy of a three-legged stool, as shown in Figure 1. The seat of the stool is customer focus. This means with total quality the customer is in the “driver’s seat”

as the primary arbiter of what is acceptable in terms of quality. Each of the three legs is a broad element of the total quality philosophy (i.e., measures, people, and processes). The “measures” leg of the stool makes the point that quality can and must be measured. The “people” leg of the stool makes the point that quality cannot be inspected into a product or service. Rather, it must be built in by people who are empowered to do their jobs the right way. The “processes” leg of the stool makes the point that processes must be improved, continually and forever. What is considered excellent today may be just mediocre tomorrow. Consequently, “good enough” is never good enough.

Another way to understand total quality as a concept is shown in Figure 2. Notice that the first part of the definition in Figure 2 explains the *what* of total quality; the second part explains the *how*. In the case of total quality, the *how* is important because it is what separates this approach to doing business from all of the others.

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.

## 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

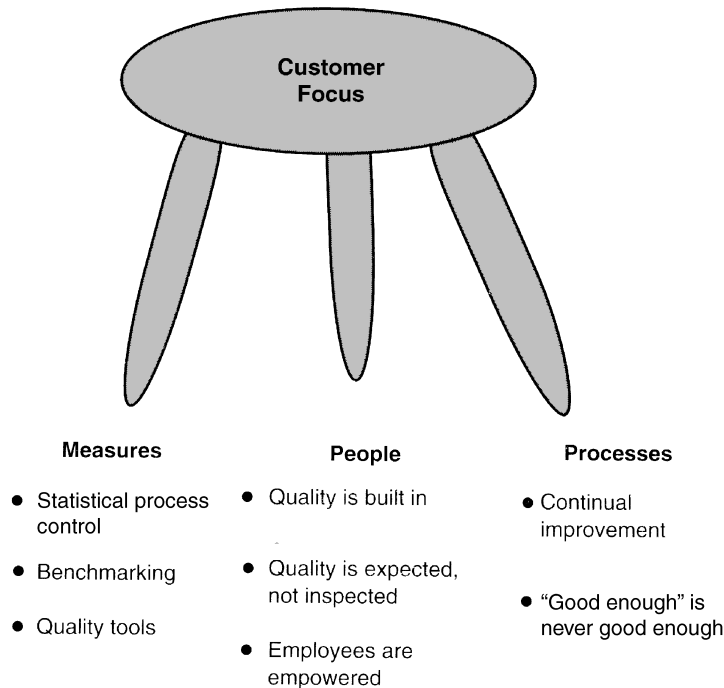


FIGURE 1 Three-Legged Stool of Total Quality



### What It Is

Total quality is an approach to doing business that attempts to maximize the competitiveness of an organization through the continual improvement of the quality of its products, services, people, processes, and environments.

### How It Is Achieved

The total quality approach has the following characteristics:

- Strategically based
- Customer focus (internal and external)
- Obsession with quality
- Scientific approach to decision making and problem solving
- Long-term commitment
- Teamwork
- Continual improvement of people, processes, products, services, and environments
- Education and training
- Freedom through control
- Unity of purpose
- Employee involvement and empowerment
- Peak performance as a top priority

FIGURE 2 Total Quality: What It Is and How It Is Achieved

quality, use of the scientific approach in decision making and problem solving, long-term commitment, teamwork, continual process improvement, bottom-up education and training, freedom through control, unity of purpose, and employee involvement and empowerment, 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. Table 1 is a timeline that shows some of the major events in the evolution of the total quality movement since the days of Taylor. Taylor is now known as “the father of scientific management.”

The most fundamental aspect of scientific management is the separation of planning and execution. Although the division of labor spawned tremendous leaps forward in productivity, it virtually eliminated the old practice of one highly skilled individual performing all the tasks required to produce a quality product. In a sense, that individual was CEO, production worker, and quality controller all rolled into one. Taylor’s scientific management did away with this by making planning the job of management and production the job of 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 engi-

neering, 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.

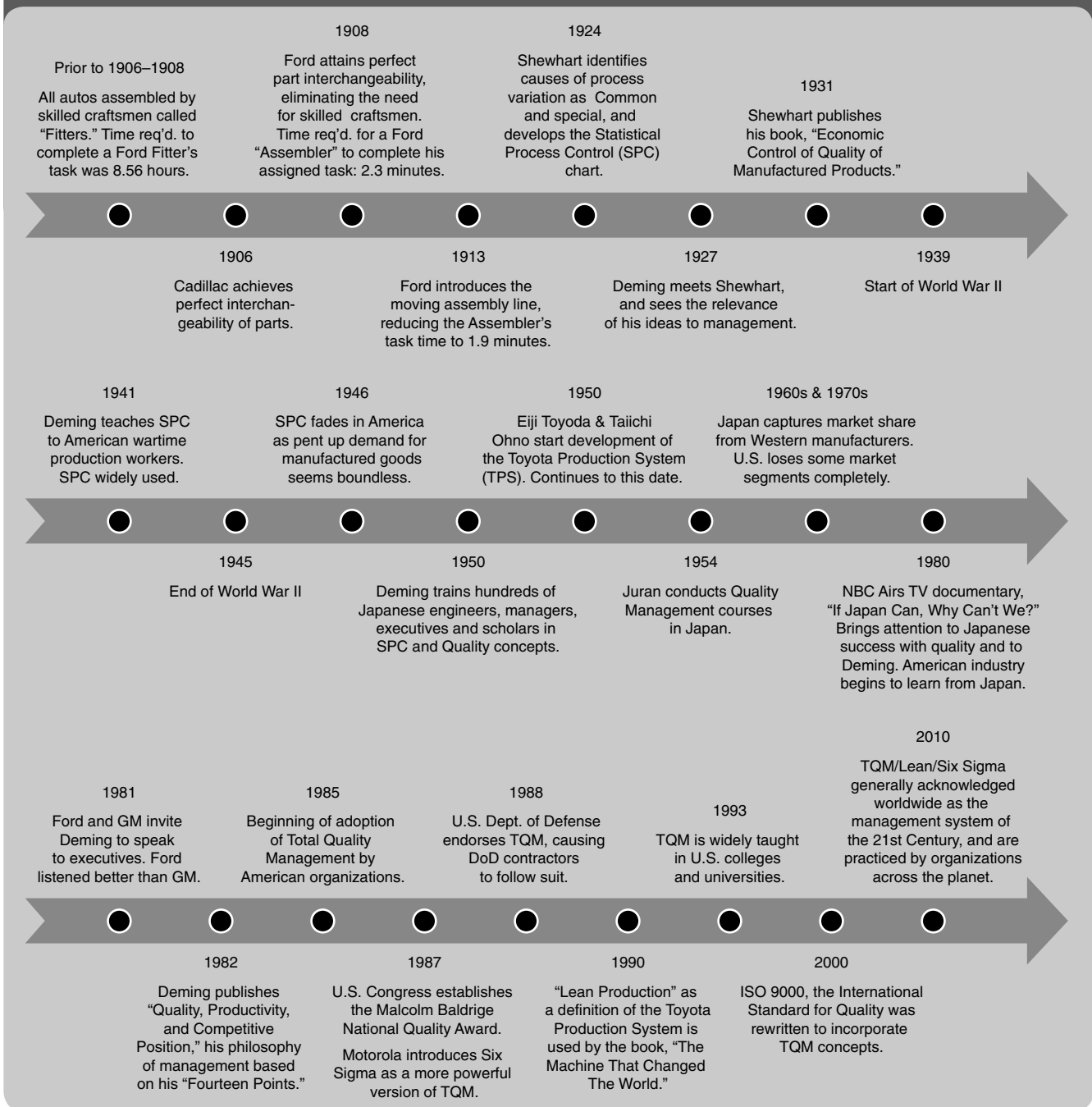
Reliability engineering emerged in the 1950s. It began a trend toward moving quality control away from the traditional after-the-fact approach and toward inserting it throughout the design and production processes. However, for the most part, quality control in the 1950s and 1960s involved inspections that resulted in nothing more than cutting out bad parts.

World War II had an impact on quality that is still being felt. In general, the effect was negative for the United States and positive for Japan. Because of the urgency to meet production schedules during the war, U.S. companies focused more on meeting delivery dates than on quality. This approach became a habit that carried over even after the war.

Japanese companies, on the other hand, were forced to learn to compete with the rest of the world in the production of nonmilitary goods. At first, their attempts were unsuccessful, and “Made in Japan” remained synonymous with poor quality, as it had been before World War II. Around 1950, however, Japan decided to get serious about quality and establishing ways to produce quality products.

Japanese manufacturers overcame a reputation for producing cheap, shabby products and developed a reputation as world leaders in the production of quality products. More than any other single factor, it was the Japanese miracle—which was not a miracle at all but the result of a concerted effort that took 20 years to really bear fruit—that got the rest of the world to focus on quality. When Western companies finally realized that quality was the key factor in global competition, they responded. Unfortunately, their first responses were the opposite of what was needed.

TABLE 1 100 Years of Selected Historic Milestones in the Global Quality Movement



In spite of these early negative reactions, Western companies began to realize that the key to competing in the global marketplace was to improve quality. With this realization, the total quality movement finally began to gain momentum.

## TWO VIEWS OF QUALITY

The total quality philosophy introduced a whole new way of looking at quality. The traditional view of quality measured process performance in defective parts per hundred produced. With total quality, the same measurement is thought of in terms of defective parts per million

produced. The traditional view focused on after-the-fact inspections of products. With total quality, the emphasis is on continual 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 employee per year. 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 improvements.
- **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 and process 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 poor quality. The total quality view is that at least 85% 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.

### KEY ELEMENTS OF TOTAL QUALITY

The total quality approach was defined in Figure 2. This definition has two components: the *what* and the *how* of total quality. What distinguishes total quality from other approaches to doing business is the *how* component of the

definition. This component has 11 critical elements, each of which is explained in the remainder of this section and all of which relate to one of the components of the three-legged stool in Figure 1.

### Strategically Based

Total quality organizations have a comprehensive strategic plan that contains at least the following elements: vision, mission, broad objectives, and activities that must be completed to accomplish the broad objectives. The strategic plan of a total quality organization is designed to give it a *sustainable competitive advantage* in the marketplace. The competitive advantages of a total quality organization are geared toward achieving world-leading quality and improving on it, continually and forever.

### Customer Focus

In a total quality setting, the customer is the driver. This point applies to both internal and external customers. External customers define the quality of the product or service delivered. Internal customers help define the quality of the people, processes, and environments associated with the products or services.

### Obsession with Quality

In a total quality organization, internal and external customers define quality. With quality defined, the organization must then become obsessed with meeting or exceeding this definition. This means all personnel at all levels approach all aspects of the job from the perspective of “How can we do this better?” When an organization is obsessed with quality, “good enough” is never good enough.

### Scientific Approach

Total quality detractors put off by such concepts as employee empowerment sometimes view total quality as nothing more than another name for “soft” management or “people” management. Although it is true that people skills, involvement, and empowerment are important in a total quality setting, they represent only a part of the equation. Another important part is the use of the scientific approach in structuring work and in making decisions and solving problems that relate to the work. This means that hard data are used in establishing benchmarks, monitoring performance, and making improvements.

### Long-Term Commitment

Organizations that implement management innovations after attending short-term seminars often fail in their initial attempt to adopt the total quality approach. This is because they look at total quality as just another management innovation rather than as a whole new way of doing business that requires an entirely new corporate culture. Too few organizations begin the implementation of total quality

with the long-term commitment to change that is necessary for success.

## Teamwork

In traditionally managed organizations, the best competitive efforts are often among departments within the organization. Internal competition tends to use energy that should be focused on improving quality and, in turn, external competitiveness.

## Continual Process Improvement

Products are developed and services delivered by people using processes within environments (systems). To continually improve the quality of products or services—which is a fundamental goal in a total quality setting—it is necessary to continually improve systems.

## Education and Training

Education and training are fundamental to total quality because they represent the best way to improve people on a continual basis. It is through education and training that people who know how to work hard learn how to also work smart.

## Freedom Through Control

Involving and empowering employees is fundamental to total quality as a way to simultaneously bring more minds to bear on the decision-making process and increase the ownership employees feel about decisions that are made. Total quality detractors sometimes mistakenly see employee involvement as a loss of management control, when in fact control is fundamental to total quality. The freedoms enjoyed in a total quality setting are actually the result of well-planned and well-carried-out controls. Controls such as scientific methodologies lead to freedom by empowering employees to solve problems within their scope of control.

## Unity of Purpose

Historically, management and labor have had an adversarial relationship in U.S. industry. One could debate the reasons

behind management–labor discord *ad infinitum* without achieving consensus. From the perspective of total quality, who or what is to blame for adversarial management–labor relations is irrelevant. What is important is this: To apply the total quality approach, organizations must have unity of purpose. This means that internal politics have no place in a total quality organization. Rather, collaboration should be the norm.

A question frequently asked concerning this element of total quality is “Does unity of purpose mean that unions will no longer be needed?” The answer is that unity of purpose has nothing to do with whether unions are needed. Collective bargaining is about wages, benefits, and working conditions, not about corporate purpose and vision. Employees should feel more involved and empowered in a total quality setting than in a traditionally managed situation, but the goal of total quality is to enhance competitiveness, not to eliminate unions. For example, in Japan, where companies are known for achieving unity of purpose, unions are still very much in evidence. Unity of purpose does not necessarily mean that labor and management will always agree on wages, benefits, and working conditions, but it does mean that *all* employees work toward the common goal.

## Employee Involvement and Empowerment

Employee involvement and empowerment is one of the most misunderstood elements of the total quality approach and one of the most misrepresented by its detractors. The basis for involving employees is twofold. First, it increases the likelihood of a good decision, a better plan, or a more effective improvement by bringing more minds to bear on the situation—not just any minds but the minds of the people who are closest to the work in question. Second, it promotes ownership of decisions by involving the people who will have to implement them.

*Empowerment* means not just involving people but also involving them in ways that give them a real voice. One of the ways this can be done is by structuring work that allows employees to make decisions concerning the improvement of work processes within well-specified parameters. Should a machinist be allowed to unilaterally drop a vendor if the vendor delivers substandard material? No. However, the machinist should have an avenue for offering his or her input into the matter.

Should the same machinist be allowed to change the way she sets up her machine? If by so doing she can improve her part of the process without adversely affecting someone else’s, yes. Having done so, her next step should be to show other machinists her innovation so that they might try it.

## Peak Performance

When effectively practiced, total quality allows every aspect of an organization to operate at peak levels. This means that all personnel and processes are operating at their best. Peak performance is essential to organizations that operate in a global environment where competition is intense, constant, and unforgiving.

### QUALITY TIP ▼

#### Continually Improving People, Processes, and Products

The total quality approach seeks to improve everything all the time forever. This means that it encompasses continually improving (1) how well people are able to do their jobs, (2) how well processes perform, and (3) the quality of products and services provided by the people and processes. To achieve total quality, it is necessary to focus more on solving problems and continually improving and less on blaming individuals for problems.

## TOTAL QUALITY PIONEERS

Total quality is not just one individual concept. It is a number of related concepts pulled together to create a comprehensive approach to doing business. Many people contributed in meaningful ways to the development of the various concepts that are known collectively as *total quality*. The three major contributors are W. Edwards Deming, Joseph M. Juran, and Philip B. Crosby. To these three, many would add Armand V. Feigenbaum and a number of Japanese experts, such as Shigeo Shingo.

### Deming's Contributions

Of the various quality pioneers in the United States, the best known is W. Edwards Deming. According to Deming biographer Andrea Gabor:

Deming also has become by far the most influential proponent of quality management in the United States. While both Joseph Juran and Armand V. Feigenbaum have strong reputations and advocate approaches to quality that in many cases overlap with Deming's ideas, neither has achieved the stature of Deming. One reason is that while these experts have often taken very nuts-and-bolts, practical approaches to quality improvement, Deming has played the role of visionary, distilling disparate management ideas into a compelling new philosophy.<sup>9</sup>

Deming came a long way to achieve the status of internationally acclaimed quality expert. During his formative years, Deming's family bounced from small town to small town in Iowa and Wyoming, trying in vain to rise out of poverty. These early circumstances gave Deming a life-long appreciation for economy and thrift. In later years, even after he was generating a substantial income, Deming maintained only a simple office in the basement of his modest home out of which he conducted his international consulting business.

Working as a janitor and at other odd jobs, Deming worked his way through the University of Wyoming, where he earned a bachelor's degree in engineering. He went on to receive a master's degree in mathematics and physics from the University of Colorado and a doctorate in physics from Yale.

His only full-time employment for a corporation was with Western Electric. Many feel that what he witnessed during his employment there had a major impact on the direction the rest of his life would take. Deming was disturbed by the amount of waste he saw at Western Electric's Hawthorne plant. It was there that he pioneered the use of statistics in quality.

Although Deming was asked in 1940 to help the U.S. Bureau of the Census adopt statistical sampling techniques, his reception in the United States during these early years was not positive. With little real competition in the international marketplace, major U.S. corpora-

### QUALITY CASE ▼

#### Autoliv Queretaro: Quality in Automotive Safety Systems

Autoliv Inc. is the world leader in automotive safety systems. The company's plant in Queretaro, Mexico employs approximately 5,000 of the company's 42,000 personnel and produces airbag cushions, airbag modules, and steering wheels for the North American automotive market. The Queretaro plant's customers include Chrysler, Ford, General Motors, Honda, Hyundai, Nissan, Mazda, Mitsubishi, Toyota, Volkswagen, and Volvo. Autoliv Queretaro received the prestigious Shingo Prize for quality by applying the principles of total quality.

The company's mission is to create, manufacture, and sell state-of-the-art automotive safety systems. Its mission is to substantially reduce traffic accidents, fatalities, and injuries. Autoliv's strategy is to be the vehicle manufacturer's first-choice supplier of safety systems through technological leadership, complete system capabilities, highest-value safety system solutions, cost efficiency, quality excellence, global presence, highest level of service and engagement, and dedicated/motivated employees.

Maintaining superior quality is at the heart of Autoliv's success. The company is committed to a *zero defects* philosophy which it maintains by applying the following strategies: (1) managing all new products using a five-checkpoint process, (2) using a global supplier manual that defines a mandatory supplier collaboration process, (3) requiring the company's suppliers to comply with ISO/TS 16949, and (4) incorporating the principles of the Autoliv Production System into all production and support processes. The company's commitment to quality earned its Queretaro plant the prestigious Shingo prize for Excellence in Manufacturing.

When the Queretaro plant was selected for the Shingo Prize, it had achieved the following quality improvements: (1) improved production efficiency by 75%, (2) reduced changeover time by 20%, (3) boosted inventory turnover from 14 to 24, (4) increased units produced per week by 94%, (5) and maintained a 100% on-time delivery rate for four consecutive years.

Source: [www.reliableplant.com/Articles/Print/4697](http://www.reliableplant.com/Articles/Print/4697)

tions felt little need for his help. Corporations from other countries were equally uninterested. However, World War II changed all this and put Deming on the road to becoming, in Andrea Gabor's words, "the man who discovered quality."<sup>10</sup>

During World War II, almost all of Japan's industry went into the business of producing war materials. After the war, those firms had to convert to the production of consumer goods, and the conversion was not very successful. To have a market for their products, Japanese firms had to enter the international marketplace. This move put them in direct competition with companies from the other industrialized countries of the world, and the Japanese firms did not fare well.

By the late 1940s, key industrial leaders in Japan had finally come to the realization that the key to competing in the international marketplace is quality. At this time, Shigeiti Mariguti of Tokyo University, Sizaturo Mishibori of Toshiba, and several other Japanese leaders invited Deming

to visit Japan and share his views on quality. Unlike their counterparts in the United States, the Japanese industrialists accepted Deming's views, learned his techniques, and adopted his philosophy. So powerful was Deming's impact on industry in Japan that the most coveted award a company there can win is the Deming Prize. In fact, the standards that must be met to win this prize are so difficult and so strenuously applied that it is now being questioned by some Japanese companies.

By the 1980s, leading industrialists in the United States were where their Japanese counterparts had been in the late 1940s. At last, Deming's services began to be requested in his own country. By this time, Deming was over 80 years old. He had not been received as openly and warmly in the United States as he was in Japan. Deming's attitude toward corporate executives in the United States can be described as cantankerous at best.

Gabor gives the following example of Deming's dealings with the U.S. executives from Ford Motor Company:

The initial contacts were unsettling for Ford. Instead of delivering a slick presentation on how the automaker could solve its quality problems—the sort of thing that became the stock in trade of U.S. quality experts during the 1980s—Deming questioned, rambled, and seemed to take pleasure in making a laughingstock of his listeners. During the first meeting, wearing one of his signature timeworn three-piece suits, Deming glowered at the car executives with steely blue eyes.<sup>11</sup>

Deming's contributions to the quality movement would be difficult to overstate. Many consider him the founder of the movement. The things for which he is most widely known are the Deming Cycle, his Fourteen Points, and his Seven Deadly Diseases.

**The Deming Cycle** Summarized in Figure 3, the Deming Cycle was developed to link the production of a product with consumer needs and focus the resources of all departments (research, design, production, 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's Fourteen Points** Deming's philosophy is both summarized and operationalized by his Fourteen Points, which are contained in Figure 4. Deming modified the specific wording of various points over the years, which accounts for the minor differences among the Fourteen Points as described in various publications. Deming stated

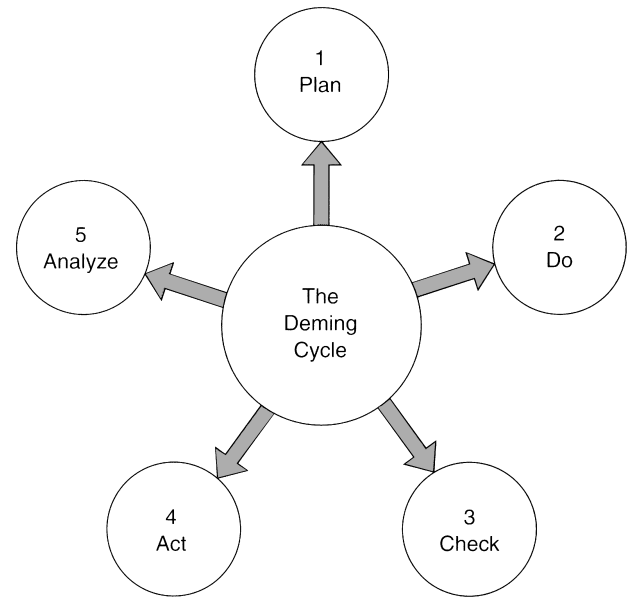


FIGURE 3 The Deming Cycle

repeatedly in his later years that if he had it all to do over again, he would leave off the numbers.

**Deming's Seven Deadly Diseases** The Fourteen Points summarize Deming's views on what a company must do to effect a positive transition from business as usual to world-class quality. The Seven Deadly Diseases summarize the factors that he believed can inhibit such a transformation (see Figure 5).

The description of these factors rings particularly true when viewed from the perspective of U.S. firms trying to compete in the global marketplace. Some of these factors can be eliminated by adopting the total quality approach, but three cannot. This does not bode well for U.S. firms trying to regain market share. Total quality can eliminate or reduce the impact of a lack of consistency, personal review systems, job hopping, and using only visible data. However, total quality will not free corporate executives from pressure to produce short-term profits, excessive medical costs, or excessive liability costs. These are diseases of the nation's financial, health care, and legal systems, respectively.

By finding ways for business and government to cooperate appropriately without collaborating inappropriately, other industrialized countries have been able to focus their industry on long-term rather than short-term profits, hold down health care costs, and prevent the proliferation of costly litigation that has occurred in the United States. Excessive health care and legal costs represent non-value-added costs that must be added to the cost of products produced and services delivered in the United States.

### Juran's Contributions

Joseph M. Juran ranks near Deming in the contributions he has made to quality and the recognition he has received as

1. Create constancy of purpose toward the improvement of products and services in order to become competitive, stay in business, and provide jobs.
2. Adopt the new philosophy. Management must learn that it is a new economic age and awaken to the challenge, learn their responsibilities, and take on leadership for change.
3. Stop depending on inspection to achieve quality. Build in quality from the start.
4. Stop awarding contracts on the basis of low bids.
5. Improve continuously and forever the system of production and service, to improve quality and productivity, and thus constantly reduce costs.
6. Institute training on the job.
7. Institute leadership. The purpose of leadership should be to help people and technology work better.
8. Drive out fear so that everyone may work effectively.
9. Break down barriers between departments so that people can work as a team.
10. Eliminate slogans, exhortations, and targets for the workforce. They create adversarial relationships.
11. Eliminate quotas and management by objectives. Substitute leadership.
12. Remove barriers that rob employees of their pride of workmanship.
13. Institute a vigorous program of education and self-improvement.
14. Make the transformation everyone's job and put everyone to work on it.

**FIGURE 4** Deming's Fourteen Points

1. Lack of constancy of purpose to plan products and services that have a market sufficient to keep the company in business and provide jobs.
2. Emphasis on short-term profits; short-term thinking that is driven by a fear of unfriendly takeover attempts and pressure from bankers and shareholders to produce dividends.
3. Personal review systems for managers and management by objectives without providing methods or resources to accomplish objectives. Performance evaluations, merit ratings, and annual appraisals are all part of this disease.
4. Job hopping by managers.
5. Using only visible data and information in decision making with little or no consideration given to what is not known or cannot be known.
6. Excessive medical costs.
7. Excessive costs of liability driven up by lawyers that work on contingency fees.

**FIGURE 5** Deming's Seven Deadly Diseases

a result. His Juran Institute Inc., in Wilton, Connecticut, is an international leader in conducting training, research, and consulting activities in the area of quality management (see Figure 6). 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 Pareto Principle
- The Juran Trilogy

**Juran's Three Basic Steps to Progress** Juran's Three Basic Steps to Progress (listed in Figure 7) 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.

**Juran's Ten Steps to Quality Improvement** Examining Juran's Ten Steps to Quality Improvement (in Figure 8), you will see some overlap between them and

**Research and Development**

We dedicate ourselves to identifying proven roads that lead to enviable results, and to creating products and services that reflect the experience of successful quality efforts.

**Consulting Services**

Our quality professionals counsel and assist managers in assessing needs, developing strategies, and applying specific methods for achieving quality goals.

**Seminars and Workshops**

Juran courses are comprehensive and practical, addressing a full spectrum of needs, industries, and functions. Courses are presented worldwide at client organizations and as public offerings.

**Training and Support Materials**

Juran videos, workbooks, texts, and reference books are more widely used and translated than those of any other source.

**FIGURE 6** Juran Institute Inc., Quality-Related Services Provided Worldwide

Source: Juran Institute Inc., www.juran.com, 2011.

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

**FIGURE 7** Juran's Three Basic Steps to Progress

Source: Juran Institute Inc., www.juran.com, 2011.

Deming's Fourteen Points. They also mesh well with the philosophy of quality experts whose contributions are explained later in this chapter.

**The Pareto Principle** The Pareto principle espoused by Juran shows up in the views of most quality experts,

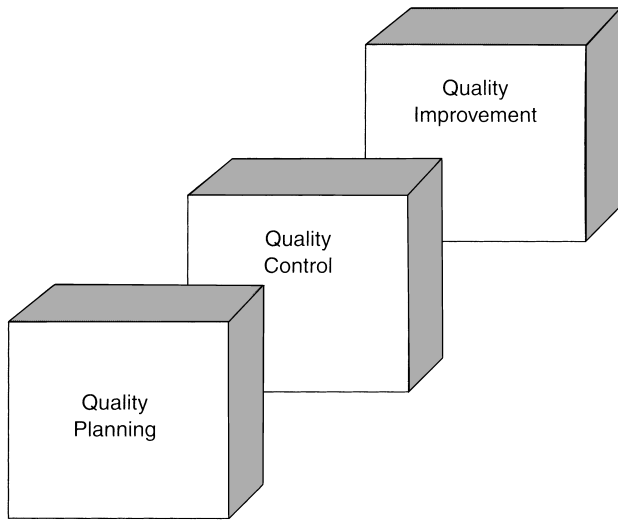
although it often goes by other names. According to this principle, organizations should concentrate their energy on eliminating the vital few sources that cause the majority of problems. Further, both Juran and Deming believe that systems that are controlled by management are the systems in which the majority of problems occur.

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.

**FIGURE 8** Juran's Ten Steps to Quality Improvement

Source: Juran Institute Inc., www.juran.com, 2011.





**FIGURE 9** The Juran Trilogy

Source: The Juran Trilogy® is a registered trademark of Juran Institute Inc. (Southbury, Connecticut), [www.juran.com](http://www.juran.com).

**The Juran Trilogy** The Juran Trilogy (Figure 9) summarizes the three primary managerial functions. Juran’s views on these functions are explained in the following sections.

**Quality Planning** Quality planning involves developing the products, systems, and processes 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 TIP ▼**

**The Pareto Principle**

The Pareto principle, named after economist Vilfredo Pareto, is more commonly known in quality circles as the 80/20 rule. This rule is used variably to contend that 80% of the quality issues in an organization are caused by 20% of the problems or that 80% of the problems can be traced to a few critical sources (the 20%). Joseph Juran is credited with applying what was originally an economic principle to management and quality. He advised organizations to focus the bulk of their improvement efforts on identifying and eliminating these few critical sources of problems.

**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 and 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 controls that will maintain gains made.

**Crosby’s 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 Corporation (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. More recently, Crosby had once again entered the business arena as a quality consultant until his death in 2001.

Crosby, who defined quality simply as conformance, 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 Quality Vaccine and Crosby’s Fourteen Steps to Quality Improvement.

Crosby’s Quality Vaccine consists of three ingredients:<sup>12</sup>

1. Determination
2. Education
3. Implementation

His Fourteen Steps to Quality Improvement are listed in Figure 10.

**KEYS TO TOTAL QUALITY SUCCESS**

Organizations that succeed never approach total quality as just another management innovation or, even worse, as a quick fix. Rather, they approach total quality as a new way of doing business. What follows are common errors organizations make when implementing total quality. The successful organizations avoid these errors.

1. Make it clear that management is committed to quality for the long term.
2. Form cross-departmental quality teams.
3. Identify where current and potential problems exist.
4. Assess the cost of quality and explain how it is used as a management tool.
5. Increase the quality awareness and personal commitment of all employees.
6. Take immediate action to correct problems identified.
7. Establish a zero defects program.
8. Train supervisors to carry out their responsibilities in the quality program.
9. Hold a Zero Defects Day to ensure all employees are aware there is a new direction.
10. Encourage individuals and teams to establish both personal and team improvement goals.
11. Encourage employees to tell management about obstacles they face in trying to meet quality goals.
12. Recognize employees who participate.
13. Implement quality councils to promote continual communication.
14. Repeat everything to illustrate that quality improvement is a never-ending process.

FIGURE 10 Crosby's Fourteen Steps to Quality Improvement

Source: Philip Crosby Associates, www.philipcrosby.com, 2011.

- **Senior management delegation and poor leadership.** Some organizations attempt to start a quality initiative by delegating responsibility to a hired expert rather than applying the leadership necessary to get everyone involved.
- **Team mania.** Ultimately teams should be established, and all employees should be involved with them. However, working in teams is an approach that must be learned. Supervisors must learn how to be effective coaches, and employees must learn how to be team players. The organization must undergo a cultural change before teamwork can succeed. Rushing in and putting everyone in teams before learning has occurred and the corporate culture has changed will create problems rather than solve them.
- **Deployment process.** Some organizations develop quality initiatives without concurrently developing plans

for integrating them into all elements of the organization (i.e., operations, budgeting, marketing, etc.).

- **Taking a narrow, dogmatic approach.** Some organizations are determined to take the Deming approach, Juran approach, or Crosby approach and use only the principles prescribed in them. None of the approaches advocated by these and other leading quality experts is truly a one-size-fits-all proposition. Even the experts encourage organizations to tailor quality programs to their individual needs.
- **Confusion about the differences among education, awareness, inspiration, and skill building.** In order for people to do their part in making the total quality approach work effectively, they must have the skills to apply the fundamental tools of quality. Making them aware of quality and inspiring them to accept it at a philosophical level are good and necessary steps in the right direction. But helping them develop the actual skills necessary to implement the concept must also be part of the transformational process.

#### QUALITY TIP ▼

##### Crosby's Four Absolutes of Quality Management

Philip B. Crosby's contributions to quality are legion, ranging from his best-selling books on quality-related subjects to his Quality College. An enduring contribution from Crosby is a set of four *absolutes* of quality management. These absolutes are as follows: (1) quality must be defined as conformance to requirements—not just as a good thing to do; (2) the best way to ensure quality is prevention, not inspection; (3) the standard for quality must be zero defects, not “close is good enough”; and (4) quality is measured by nonconformance, not indexes.

Source: www.businessballs.com, retrieved on January 15, 2011.

## THE FUTURE OF QUALITY MANAGEMENT IN THE TWENTY-FIRST CENTURY

There are several trends that will shape the future of quality management. These trends are as follows:

- **Increasing global competition.** More and better competition from emerging industrialized nations will be an ongoing part of life for organizations.

- **Increasing customer expectations.** Today's global customer is interested in not just 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, after-purchase support, and social responsibility.
- **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.

### Quality Management Characteristics for the Future

To succeed in the global marketplace for now and in the future, organizations need 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 continually 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
- A commitment to fast-paced, constant learning, and an ability to respond quickly to changes in the competitive environment
- A commitment to achieving end-to-end collaboration using web-based, on-demand tools that are fully integrated throughout the supply chain
- A commitment to maintaining an environment in which creativity, critical thinking, and innovation are not just encouraged and supported, but demanded

As long as the concept of competition exists, there will be a need for quality management. In the twenty-first cen-

tury, globalization will only intensify the level of competition businesses face. That is why the text you are now reading has been translated into Korean and Indonesian. The concept of quality management is being adopted globally and, as a result, will continue to be applied and refined through this century.

Companies that develop the characteristics listed above will be those that fully institutionalize the principles of quality management. 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.

### QUALITY CERTIFICATIONS

In a competitive work environment, one of the ways that quality professionals can distinguish themselves, enhance their credibility, and improve their career potential is to become certified in an appropriate quality discipline. The American Society for Quality (ASQ) offers certifications in a variety of disciplines, including Manager of Quality/Organizational Excellence, Quality Engineer, Reliability Engineer, Software Quality Engineer, Quality Auditor, Six Sigma Black Belt, Six Sigma Green Belt, Quality Technician, Calibration Technician, Quality Improvement Associate, Quality Inspector, Quality Process Analyst, Hazard Analysis and Critical Point Auditor, Biomedical Auditor, and Pharmaceutical GMP Professional.

The requirements for all of these certifications are available at the ASQ's Web site: [www.asq.org/certification](http://www.asq.org/certification). At this Web site, there is a list of the various certifications available through the ASQ. Simply click on the certification of interest, and all relevant information pertaining to that certification will be available. In addition, the ASQ provides assistance to potential examinees who are preparing for certification examinations: They may find the help they need under the heading "Prepare for the exam" at the applicable page on the ASQ's certification Web site address ([www.asq.org/certification](http://www.asq.org/certification)). The requirements and body of knowledge relating to the most pertinent of these certifications—Manager of Quality/Organizational Excellence, Quality Engineer, and Quality Technician—are summarized in the following paragraphs.

#### Manager of Quality/Organizational Excellence<sup>13</sup>

This certification is for managers who lead and champion continual process-improvement initiatives, facilitates and leads team efforts to establish and monitor customer and supplier relations, supports strategic planning and deployment efforts, assists in the development of measurement systems, motivates staff, evaluates staff, manages projects, manages human resources, analyzes budgets and finances, evaluates risk, and uses management tools and techniques.

**Education and Experience Requirements** In order to sit for the Manager of Quality/Organizational Excellence examination, individuals must have ten years of experience in one or more of the following areas: leadership, strategic plan development and deployment, management elements and methods, quality management tools, customer focus, supply chain management, and training and development. At least five of the ten years of experience in one or more of these areas of expertise must be at the decision-making level. Education waivers of up to five years are allowed for individuals who have completed a diploma or degree from an institution accredited by the ASQ. The waivers apply as follows: (1) one year for a technical diploma, (2) two years for an associate degree, (3) four years for a baccalaureate degree, and (4) five years for a master or doctorate degree.

**Examination Topics** The ASQ offers a practice examination that helps prospective examinees determine what the test covers and what areas or topics they might need to review more thoroughly. The body of knowledge covered on the examination for certification as a Manager of Quality/Organizational Excellence is as follows:

**Leadership.** Organizational structures and culture, leadership challenges, team and team processes, and the ASQ Code of Ethics.

**Strategic Plan Development and Deployment.** Strategic planning models, business environment analysis, and strategic plan development.

**Management Elements and Methods.** Management skills and abilities, communication skills and abilities, project management, quality systems, and quality models and theories.

**Quality Management Tools.** Problem-solving tools, process management, and measurement/metrics.

**Customer-Focused Organizations.** Customer identification, segmentation, and relationship management.

**Supply Chain Management.** Supplier selection, supplier communications, supplier performance, supplier improvement, supplier certification/partnerships/alliances, and supplier logistics.

**Training and Development.** Training plans, needs analysis, training material/curriculum development and delivery, and training effectiveness/evaluation.

## Quality Engineer<sup>14</sup>

The Quality Engineer certification is for individuals who develop and operate quality control systems, apply and analyze testing and inspection procedures, use metrology and statistical systems to diagnose and correct quality problems, understand human factors and motivation, understand quality cost techniques, develop and administer management information systems, and audit quality systems for identifying deficiencies and correcting them.

**Education and Experience Requirements** In order to sit for the Quality Engineer certification examination, individuals must have a minimum of eight years of work experience in one or more of the following disciplines: management and leadership, the quality system, product and process design, product and process control, and continuous improvement. Waivers of part of the experience requirement are available to individuals who have completed a diploma or degree from an institution accredited by the ASQ as follows: (1) one year for a technical diploma, (2) two years for an associate degree, (3) four years for a baccalaureate degree, and (4) five years for a masters or doctorate degree.

**Examination Topics** The ASQ provides a practice examination that helps prospective examinees find out what the test covers and what areas or topics they might need to review more thoroughly. The body of knowledge covered on the examination for certification as a Quality Engineer is as follows:

**Management and Leadership.** Topics include quality philosophies and foundations, the quality management system, the ASQ Code of Ethics, leadership principles and techniques, facilitation principles and techniques, communication skills, customer relations, supplier management, and barriers to quality.

**The Quality System.** Topics include elements of the quality system, documentation of the quality system, quality standards and other guidelines, quality audits, cost of quality, and quality training.

**Product and Process Design.** Topics include classification of quality characteristics, design inputs and review, technical drawings and specifications, design verification, and reliability/maintainability.

**Product and Process Control.** Topics include tools, material control, acceptance sampling, measurement and testing, metrology, and measurement analysis.

**Continuous Improvement.** Topics include quality control tools, quality management planning tools, continuous improvement techniques, corrective action, and preventive action.

**Quantitative Methods and Tools.** Topics include collecting and summarizing data, quantitative concepts, probability distributions, statistical decision making, relationships between variables, statistical process control, process and performance capability, and design and analysis of experiments.

## Quality Technician<sup>15</sup>

This certification is for paraprofessionals who—under the direction of quality engineers and managers—analyze and solve quality problems, prepare inspection plans and instructions, select applications for sampling plans, prepare procedures, train inspectors, perform audits, analyze quality data, analyze quality costs, and apply basic statistical methods for process control.

**Education and Experience Requirements** In order to sit for the Quality Technician examination, individuals must have at least four years of higher education and/or work experience in one or more of the following disciplines: quality concepts and tools, statistical techniques, metrology and calibration, inspection and testing, quality audits, and preventive/corrective action. Education waivers of up to three years are allowed for individuals who have completed a certification program or degree from an institution accredited by the ASQ. The waivers apply as follows: (1) one year for certification through the Quality Technology program of a community college or technical school, (2) two years for an associate degree, and (3) three years for a baccalaureate, masters, or doctorate degree.

**Examination Topics** The ASQ offers a practice examination that helps prospective examinees find out what the test covers and what topics they might need to review more thoroughly. The body of knowledge covered on the examination for certification as a Quality Technician is as follows:

**Quality Concepts and Tools.** Topics include quality concepts, quality tools, and team functions.

**Statistical techniques.** Topics include general concepts, calculations, and control charts.

**Metrology and Calibration.** Topics include measurement and test equipment and calibration.

**Inspection and Testing.** Topics include blueprint reading and interpretation, inspection concepts, inspection techniques and processes, and sampling.

**Quality Audits.** Topics include audit types, audit components, and tools/techniques.

**Preventive and Corrective Action.** Topics include preventive action, corrective action, and nonconforming material.

For more detail concerning the certification examinations, readers are encouraged to visit the certification pages of the ASQ's Web site: [www.asq.org/certification](http://www.asq.org/certification). Details concerning study materials, costs, examination dates, and application procedures are provided on these pages.

## SUMMARY

1. *Quality* has been defined in a number of different ways. When viewed from a consumer's perspective, it means meeting or exceeding customer expectations.
2. Total quality is an approach to doing business that attempts to maximize an organization's competitiveness through the continual improvement of the quality of its products, services, people, processes, and environments.
3. Key characteristics of the total quality approach are as follows: strategically based, customer focus, obsession with quality, scientific approach, long-term commitment, teamwork, continual process improvement, bottom-up education and training, freedom through control, unity of purpose, employee involvement and empowerment, and peak performance.
4. The rationale for total quality can be found in the need to compete in the global marketplace. Countries that are competing successfully in the global marketplace are seeing their quality of living improve. Those that cannot are seeing theirs decline.
5. W. Edwards Deming is best known for his Fourteen Points, the Deming Cycle, and his Seven Deadly Diseases.
6. Joseph M. Juran is best known for Juran's Three Basic Steps to Progress, Juran's Ten Steps to Quality Improvement, the Pareto Principle, and the Juran Trilogy.
7. Common errors made when starting quality initiatives include senior management delegation and poor

leadership; team mania; the deployment process; a narrow, dogmatic approach; and confusion about the differences among education, awareness, inspiration, and skill building.

8. Trends affecting the future of quality management include increasing global competition, increasing customer expectations, opposing economic pressures, and new approaches to management.

## KEY TERMS AND CONCEPTS

Bottom-up education and training  
Continual process improvement  
Crosby's Fourteen Steps to Quality Improvement  
Crosby's Quality Vaccine  
Customer focus  
Deming Cycle  
Deming's Fourteen Points  
Deming's Seven Deadly Diseases  
Employee involvement and empowerment  
Freedom through control  
Global customer  
The Juran Trilogy  
Long-term commitment  
Obsession with quality  
Pareto Principle  
Peak Performance

Quality  
Quality control  
Quality improvement  
Quality planning  
Scientific approach  
Teamwork  
Total quality  
TQC (Total Quality Control)  
TQL (Total Quality Leadership)  
TQM (Total Quality Management)  
Unity of purpose

## FACTUAL REVIEW QUESTIONS

1. Define the term *quality*.
2. What is total quality?
3. List and explain the key elements of total quality.
4. Explain the rationale for the total quality approach to doing business.
5. Describe the following concepts:
  - Deming's Fourteen Points
  - The Deming Cycle
  - Deming's Seven Deadly Diseases
6. List and explain Juran's main contributions to the quality movement.
7. Why do some quality initiatives fail?
8. For what contributions to the quality movement is Philip B. Crosby known?
9. Summarize the most common errors made when starting quality initiatives.
10. Explain the trends that are affecting the future of quality management.

## CRITICAL THINKING ACTIVITY

### Have We Spoiled Customers?

"If you want to understand how the worldwide quality movement has benefited consumers, just look at automobiles. What used to be considered a luxury option is now just standard," said one quality manager. "That is precisely the problem," said another quality manager, "We have spoiled the consumer. Now customers will never be happy no matter what we do." Join this debate. What is your opinion concerning the following questions?

1. What features in the modern automobile are customer driven?
2. Henry Ford once said something to the effect that the customer can have any color Model T he wants, as long as it's black. How did the world evolve from Henry

Ford's attitude toward customers to the modern attitude of customer-driven quality?

3. Are global consumers spoiled and unrealistic in their expectations, or are they finally demanding their rights in the marketplace?
4. How has the worldwide demand for quality driven the concept of innovation? How has innovation changed your life?

## DISCUSSION ASSIGNMENT 1

### Winning and Longevity

A professional baseball team set its sights on winning the World Series. The team owner wanted to win big and win fast. Consequently, the team sank all of its resources into trading for the best players in the league. It was able to obtain enough of them that within two seasons the team was the World Series champion. However, the team had committed such a high percentage of its financial resources to players' salaries that other important elements of the team began to suffer. Its stadium quickly fell into such a state of disrepair that fans began to stay home. Training facilities also began to suffer, which caused discontent among the players. The money left over to pay the salaries of coaches wasn't enough to hold onto the good ones, most of whom accepted better offers from other teams. In short, by focusing so intently on the desired end result, this organization neglected other important aspects of building a competitive team. As a result, the team's World Series championship was a short-lived once-in-a-lifetime victory. The very next season the team's crumbling infrastructure sent it tumbling to the bottom of its division. Without the people, processes, and environment to turn the situation around, the team was eventually sold at a loss and moved to another city.

### DISCUSSION QUESTIONS

Discuss the following questions in class or outside of class with your fellow students:

1. Why would a company that is turning out a satisfactory product want to continually examine its processes and the work environment? What happened to the old adage "If it's not broke, don't fix it"?
2. Create a manufacturing, processing, or service sector parallel for this activity. Discuss how this assignment would apply to a company.

## DISCUSSION ASSIGNMENT 2

### How Japan Caught Up with the United States and How the United States Caught Up with Japan Again

Immediately following World War II, the quality of products produced by Japanese companies was not good enough to

compete in the international marketplace. The only advantage Japanese companies had was price. Japanese goods, as a rule, were cheap. For this reason, Western manufacturers, particularly those in the United States, saw the Japanese threat as being rooted in cost rather than quality.

Reading the future more accurately, albeit belatedly, Japanese companies saw quality as the key to success and, in 1950, began doing something about it. While Japanese companies were slowly but patiently and persistently creating a quality-based infrastructure (people, processes, and facilities), American companies were still focusing on cost, shifting the manufacture of labor-intensive products offshore and, at the same time, neglecting infrastructure improvements.

By the mid-1970s, the quality of Japanese manufactured goods in such key areas as automobiles and consumer electronics products was better than that of competing American firms. As a result, Japanese exports increased exponentially, while those of Western countries experienced corresponding decreases.<sup>16</sup>

This explains how Japan rose up out of the ashes of World War II to become a world-leading industrial nation. But the story does not end there. After losing market share to the Japanese for more than two decades, companies in the United States began to embrace the principles of quality management. As a result, by the mid-1990s companies in the United States had reasserted themselves in the global marketplace.

Now, the two countries are like well-matched heavyweight boxers who slug it out every day in the world of global business. On any given day, either can win the global business battle. There are no longer any automatic winners. Regardless of whether they are Japanese or American, those companies that adhere to the principles of quality management and continually improve are the ones that will win in today's marketplace.

#### DISCUSSION QUESTION

Discuss the following question in class or outside of class with your fellow students:

1. Why do you think that companies in the United States were slow to adopt the quality management principles Japanese companies had used to gain market share worldwide?

#### ENDNOTES

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# QUALITY AND GLOBAL COMPETITIVENESS

*I'm surprised how many people think you can throw a hand grenade at a competitor and expect he'll stand there and enjoy it. —Frank Lorenzo*

## MAJOR TOPICS

- The Relationship Between Quality and Competitiveness
- Cost of Poor Quality
- Competitiveness and the U.S. Economy
- Factors Inhibiting Competitiveness
- Comparisons of International Competitors
- Human Resources and Competitiveness
- Characteristics of World-Class Organizations
- Management-by-Accounting: Antithesis of Total Quality
- U.S. Companies: Global Strengths and Weaknesses
- Quality Management Practices in Asian Countries

One of the results of World War II combined with subsequent technological advances was the creation of the global marketplace. Following the war, industrialized countries began looking for markets outside their own borders. Although the war gave the world a boost in this regard, it was advances in technology that really made the global marketplace possible. Advances in communications technology have made people from all over the world electronic neighbors and electronic customers.

Advances in transportation technology allow raw materials produced in one country to be used in the manufacture of products in a second country that are, in turn, sold to end users in a third country. For example, leather produced in Australia might be shipped as raw material to Italy, where it is used in the manufacture of shoes and purses that are sold in the United States, France, and Japan. At the same time, leather produced in South America is sent to shoe manufacturers in Indonesia. These manufacturers, like their Italian counterparts, sell their shoes in the United States, France, and Japan. This means the manufacturers in

Italy compete with the manufacturers in Indonesia. This simple example demonstrates the kind of competition that takes place on a global scale every day. Such competition has become the norm, and it can be intense.

It used to be only large corporations and multinational corporations that faced global competition; now even small companies are affected. Today no company is immune to the effects of global competition.

## THE RELATIONSHIP BETWEEN QUALITY AND COMPETITIVENESS

The relationship between quality and competitiveness is best illustrated by an example from the world of athletics. Consider track star Juan Arballo. In high school, he was his track team's best sprinter. Competing at the district level, Juan easily topped the competition in such events as the 100-, 200-, and 400-meter runs and several relays in which he was the anchor. He did well-enough in high school to win a college scholarship. However, at the college level the competition was of a higher quality, and Juan found he had to train harder and run smarter to win. This he did, and although he no longer won every race, Juan did well-enough to pursue a spot on the U.S. Olympic team. In the Olympic Trials, the quality of the competition was yet again better than that to which Juan was accustomed. He made the Olympic team but only in two events: the 200-meter dash and the 4 × 100 relay.

In the preliminary events at the Olympics, Juan Arballo found the quality of his competitors to be even better than he had imagined it would be. Some competitors had preliminary times better than the best times he had ever run in meets. Clearly, Juan faced the competitive challenge of his career. When his event was finally run, Juan, for the first time in his life, did not place high enough to win a medal. The quality of the global competition was simply beyond his reach.

From Chapter 2 of *Quality Management for Organizational Excellence: Introduction to Total Quality*, 7th Edition. David L. Goetsch, Stanley B. Davis. Copyright © 2013 by Pearson Education, Inc. All rights reserved.



In this example, 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. Like Juan Arballo, 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.

### COST OF POOR QUALITY

Many business executives adopt the attitude that ensuring quality is good thing to do until hard times set in and cost cutting is necessary. During tough times, quality initiatives are often the first functions to go. Companies that take this approach are those that have never integrated continual quality improvement as a normal part of doing business. Rather, they see it as a stand-alone, separate issue. What executives in such companies fail to calculate or to even understand is the costs associated with poor quality. This ironic dilemma is best illustrated with an example of two companies.

### A Tale of Two Companies

Two companies, ABC Inc. and XYZ Inc., both need to compete in the global marketplace in order to survive. As might be expected, over the years competition has become increasingly intense. In order to be more competitive, ABC's executives undertook a major company-wide cost-cutting initiative. They eliminated quality audits; changed from trusted, proven suppliers to low-bid suppliers; purchased new computer systems; cut back on research and development; and reduced customer service staff.

These cost-cutting strategies did have the desired effect of decreasing the company's overhead, but they also had the unplanned consequences of disrupting the company's ability to satisfy customers and reducing the company's potential to develop new business in the future. The net outcome of all this was unhappy customers, disenchanted employees, and a decline in business. To make matters even worse, the company was still struggling with the poor performance record that caused its executives to want to cut costs in the first place.

The executives of XYZ Inc. also needed to make some changes in order to stay competitive, but they decided to take a different approach. XYZ's management team set out to identify all of the costs that would disappear if their company improved its performance in key areas. The costs identified included those associated with the following: late deliveries to customers, billing errors, scrap and rework, and accounts payable errors. In other words, XYZ's executives decided to identify the costs associated with poor quality. Having done

so, they were able to begin improvement projects in the areas identified without making cuts in functions essential to competitiveness (e.g., product quality, research and development, customer service).

### Cost of Poor Quality and Competitiveness

Few things affect an organization's ability to compete in the global marketplace more than the costs associated with poor quality. When an organization does what is necessary to improve its performance by reducing deficiencies in key areas (cycle time, warranty costs, scrap and rework, on-time delivery, billing, etc.), it can reduce overall costs without eliminating essential services, functions, product features, and personnel. Reducing the costs associated with poor quality is mandatory for companies that hope to compete in the global marketplace. Reducing such costs is one of the principal drivers behind the total quality concept of continual improvement.

Figure 1 summarizes both the traditional and the hidden costs of poor quality. The key principle to understand when examining the hidden costs shown in Figure 1 is that if every activity in an organization is performed properly every time, these costs simply disappear.

### Interpreting the Costs of Poor Quality

Once activities have been identified that exist only or primarily because of poor quality, improvement projects can be undertaken to correct the situation. It is important at this stage to select those projects that have the greatest potential to yield the highest return. The following steps can be used to measure the costs of poor quality so that selected improvement projects have the highest priority:

1. Identify all activities that exist only or primarily because of poor quality.
2. Decide how to estimate the costs of these activities.

Traditional Costs	
<input checked="" type="checkbox"/> Waste	<input checked="" type="checkbox"/> Customer returns
<input checked="" type="checkbox"/> Rejects	<input checked="" type="checkbox"/> Inspection
<input checked="" type="checkbox"/> Testing	<input checked="" type="checkbox"/> Recalls
<input checked="" type="checkbox"/> Rework	
Hidden Costs	
<input checked="" type="checkbox"/> Excessive overtime	<input checked="" type="checkbox"/> Handling complaints
<input checked="" type="checkbox"/> Pricing errors	<input checked="" type="checkbox"/> Expediting
<input checked="" type="checkbox"/> Billing errors	<input checked="" type="checkbox"/> System costs
<input checked="" type="checkbox"/> Excessive turnover	<input checked="" type="checkbox"/> Planning delays
<input checked="" type="checkbox"/> Premium freight costs	<input checked="" type="checkbox"/> Late paperwork
<input checked="" type="checkbox"/> Development cost of the failed product	<input checked="" type="checkbox"/> Lack of follow-up
<input checked="" type="checkbox"/> Field service costs	<input checked="" type="checkbox"/> Excess inventory
<input checked="" type="checkbox"/> Overdue receivables	<input checked="" type="checkbox"/> Customer allowances
	<input checked="" type="checkbox"/> Unused capacity

FIGURE 1 Factors to Consider When Quantifying the Costs of Poor Quality

3. Collect data on these activities and make the cost estimates.
4. Analyze the results and take necessary corrective actions in the proper order of priority.

Reducing the cost of poor quality reduces all other costs—product costs, the cost of doing business, and so on. This, in turn, improves the superior value equation: quality, cost, and service.

## COMPETITIVENESS AND THE U.S. ECONOMY

The United States came out of World War II as the only major industrialized nation with its manufacturing sector completely intact. A well-oiled manufacturing sector and the availability of abundant raw materials helped the United States become the world leader in the production and export of durable goods. This resulted in a period of unparalleled prosperity and one of the highest standards of living ever experienced by any country.

While the United States was enjoying its position as the world's preeminent economic superpower, the other industrialized nations of the world, particularly Japan and Germany, were busy rebuilding their manufacturing sectors. As Japanese and German manufacturers rebuilt, two things became apparent to them:

1. To succeed, they would have to compete globally.
2. To compete globally, they would have to produce goods of world-class quality, which meant producing better goods but at reasonable, competitive prices.

Basking in their prosperity, U.S. manufacturers were slow to catch on that the game had changed from mass production with acceptable levels of waste to quality production with things done right the first time every time to provide superior value for customers. The old game was best cost. The new game had become best cost *and* best quality. When foreign companies—through a combination of better training, better technology, and better management—began to eat away at markets, U.S. companies, mistakenly seeing cost rather than quality as the issue, began sending work offshore to hold down labor costs. By the time U.S. companies learned that quality and value were key to success in the global marketplace, Japan, Germany, Taiwan, and Korea had made major inroads into global markets previously dominated by U.S. manufacturers (i.e., steel, automobiles, computers, and consumer electronics). In a relatively short period of time, the United States went from the world's leading lender and exporter to the world's biggest debtor, with a huge balance-of-trade deficit. By 1980, the United States was consuming more than it produced and the trend continues to this day.

### Impact of Competitiveness on Quality of Life

A nation's ability to compete in the global marketplace has a direct bearing on the quality of life of its citizens. Because

#### QUALITY TIP ▼

##### The United States and the Global Marketplace

Companies in the United States have had to learn the hard way that the key to winning in the global marketplace is consistently providing superior value for customers. Superior value consists of superior quality, cost, and service. By the time this realization set in, the U.S. companies in such sectors as automobiles and consumer electronics had lost substantial market share to their competitors in Japan, Korea, and such emerging industrial nations as China and Indonesia. The companies, regardless of their country of origin, that will survive and thrive in the global marketplace are those that can (1) achieve consistent peak performance from people, processes, suppliers, management systems, and all other factors that can effect their ability to deliver superior value and (2) continually improve what passes for peak performance.

the ability to compete translates into the ability to do a better job of producing quality goods, it is critical that nations and individual organizations within them focus their policies, systems, and resources in a coordinated way on continually improving both quality and competitiveness.

The United States began the first decade of the new century poised on the precipice of a growing gap between the haves and the have-nots. While Canada, France, Germany, Italy, Japan, Sweden, and Great Britain have taken steps to link economics, education, and labor market policy in ways that promote competitiveness, the United States is still debating the need for an industrial policy and struggling to reverse the decline of its public schools.

During the 1980s, the United States improved productivity by putting more people to work. Other countries improved their productivity by making the individual worker more efficient. Most new entrants into the workforce during the 1970s and 1980s were people who had not worked previously, primarily women. This influx of new workers helped the United States maintain its traditionally high level of productivity. However, by the 1990s, the gains that could be made by increasing the number of people in the workforce had been made.

From 2010 to the foreseeable future, the number of people in the prime working-years age groups in the United States will be on the decline.<sup>1</sup> As the size of the workforce continues the downward trend that began in the early 1990s, the only way to improve productivity will be to do what other industrialized countries have done—concentrate on improving the efficiency of individual workers. In other words, businesses in the United States will need to get more work out of fewer workers. As some businesses have already learned, the best way to do this is to adopt the total quality philosophy.

Figure 2 contains several vignettes relating to the quality of life in the United States. This figure presents either a bleak picture of bad times to come or an unprecedented national challenge. To meet the challenge, companies in the

**FIGURE 2** Quality of Life Issues in the United States

- Many of the higher paying manufacturing jobs are being exported to foreign countries.
- The number of people having to work at more than one job to maintain their quality of life has increased continually since the 1960s.
- The most financially rewarding work years have historically been those between ages 40 and 50. In the 1950s, people in this age bracket experienced a 36% increase in real income. By 2008, their counterparts had experienced a decline in real income and the trend continues.
- The gap between the haves and have-nots in America is growing.

United States will have to produce world-class value, which will require a commitment to superior quality, cost, and service.

## FACTORS INHIBITING COMPETITIVENESS

Improving competitiveness on a national scale is no simple matter. Much can be done at the level of the individual company, where the total quality approach can be applied to great advantage, but competitiveness on a national scale requires more than just total quality. Students of quality management must understand this point. Failure to understand the limits of total quality has caused some business leaders to expect too much too soon. This, as a result, has turned them into detractors.

This section describes factors that can inhibit competitiveness but are beyond the scope of total quality. They are socioeconomic and sociopolitical in nature and are indigenous to the United States. In the age of global competition, managers should apply the principles of total quality to help make their individual organizations more competitive. Simultaneously, they should work through the political and social systems as private citizens and community leaders to help level the playing field among nations by correcting the inhibitors explained in this section. These inhibitors fall into the following categories: business- and government-related factors, family-related factors, and education-related factors.

### Business- and Government-Related Factors

Those U.S. companies trying to compete in the global marketplace are rowing upstream while dragging an anchor. Actually, they drag three anchors. This was pointed out many years ago by W. Edwards Deming when he first set forth his Seven Deadly Diseases. His second, sixth, and seventh deadly diseases are as follows:<sup>2</sup>

- Emphasis on short-term profits fed by fear of unfriendly takeover attempts and pressure from lenders or shareholders
- Excessive medical costs
- Excessive costs of liability inflated by lawyers working on contingency fees

Each of these diseases adds cost to a company's products without adding value. Nothing could be worse when viewed from the perspective of competitiveness. A company might equal all competitors point for point on all quality and productivity criteria and still lose in the marketplace because it is a victim of deadly diseases that drive up the cost of its product.

Excessive medical costs and litigation, primarily related to workers' compensation, have also slanted the playing field in favor of foreign competitors. The annual cost of workers' compensation to U.S. businesses is almost \$30 billion. This is a non-value-added cost that increases the price these businesses must charge for their products. Litigation and the associated legal costs have made tort reform an issue in the U.S. Congress and in the legislatures of most states. However, intense lobbying by trial lawyers has prevented any significant tort reform.

Overcoming these business-related inhibitors will require business and government to work together in a positive, constructive partnership to enact policies that will reduce these non-value-added costs to a minimum. To accomplish this goal, the United States will have to undertake major restructuring of its financial, legal, and medical systems.

### Family-Related Factors

Human resources are a critical part of the competitiveness equation. Just as one of the most important factors in fielding a competitive athletic team is having the best possible players, one of the most important factors in fielding a competitive company is having the best possible employees. Consequently, the quality of the labor pool is important. The more knowledgeable, skilled, motivated, and able to learn members of the labor pool are, the better.

Well-educated, well-trained, motivated members of the labor pool quickly become productive employees when given jobs. Although providing ongoing training for employees is important in the age of global competitiveness, the type of training provided is important. Organizations that can offer training that has immediate and direct application spend less than those that have to begin by providing basic education for functionally illiterate employees. Since the 1970s, U.S. businesses have had to devote increasing amounts of money to basic education efforts, whereas foreign competitors have

been able to provide advanced training that very quickly translates into better quality and productivity.

Many factors account for this difference. Some of these can be traced directly to the family. If the family unit, regardless of how it is constituted, is the nation's most important human resource development agency, the labor pool from which U.S. companies must draw their employees cannot match that in competing countries.

Single parents who must work full-time have little or no time to help their children excel in school. Children with parents who do not value education are unlikely to value it themselves. If the family has a strong influence—positive or negative, by design or by default—on the attitudes of children toward learning and work, the United States faces deep-seated problems that must be solved if its companies are going to compete in the global marketplace.

### Education-Related Factors

The transition from classroom to workplace has never been easy, but in the age of global competition it has only become more difficult. The needs of employers have increased markedly. Unfortunately, the academic performance of students in the United States has not kept pace with changes in the global marketplace. High school graduation rates in the United States rank near the bottom when compared with those in other leading industrialized nations—nations America must compete with. In addition, the performance of those students who do graduate from high school is markedly lower than that of their contemporaries in competing industrialized countries.

On international tests of academic performance in such key areas as reading, mathematics, science, and problem solving, American students lag well behind their contemporaries in other countries. This is bad news for employers in the United States that must compete in an increasingly global environment. Human performance is one of the key ingredients in quality, productivity, value, organizational excellence, and all of the other factors that affect global competitiveness. Students who enter the workplace unable to perform at competitive levels in reading, mathematics, science, and problem solving just handicap their employers.

Figure 3 compares annual expenditures per pupil for leading industrialized countries. Of the top seven, the United States spends the most, whereas Korea spends the least. Figure 4 compares the number of school days required of students annually in the leading industrialized countries. With this criterion, the order is reversed when comparing the United States and Japan.

Figures 5, 6, 7, and 8 show the actual rankings of student performance on international tests of reading, mathematics, science, and problem solving as tracked by the Organization for Economic Cooperation and Development (OECD). Figure 5 shows the relative performance rankings of students in mathematics literacy. The average score of students from the United States is well below the international average (474 versus 498). Figure 6 shows similar

Country	Annual Funding (\$)
<b>United States</b>	<b>7,560</b>
Italy	6,783
Japan	5,771
Germany	4,237
France	4,777
United Kingdom	4,416
Korea	3,714

**FIGURE 3** Comparison of Per-pupil Funding in Selected Industrialized Countries

Source: The Management Institute, *Global Update* (January 2011), 13.

Country	Average School Days
Japan	240
Korea	222
Taiwan	222
Israel	215
Scotland	191
Canada	188
<b>United States</b>	<b>178</b>

**FIGURE 4** Comparison of School Days per Year in Selected Industrialized Countries

Source: The Management Institute, *Global Update* (January 2011), 14.

results in science literacy. Figure 7 shows that students from the United States scored an average of 495 on reading while the average international score was 500. Figure 8 shows that students from the United States scored an average of 477 while the international average was 500. These scores do not bode well for the United States or for its employers who must compete in the global arena. In fact, what the scores mean is that if global competition were a footrace, the United States would be starting 100 yards behind in a 200-yard race.

### U.S. Manufacturers and Global Competition

The most important sectors in determining the quality of life in a country are manufacturing and agriculture. The United States has led the world in agricultural production for many years and still does. The United States also led the world in manufacturing productivity for many years. Beginning with the 1960s, however, this lead began to slip. The decline continued and accelerated through the 1980s to the point that the U.S. manufacturing sector entered the 1990s struggling uphill to regain ground. In the mid-1990s, however, the United States began to reemerge as a world-class competitor. No longer is the United States, or any other country, the clear-cut leader in terms of manufacturing productivity. With the

Mean Achievement in Math Literacy	
Country	Math Literacy
Hong Kong	550
Finland	544
Korea	542
Netherlands	538
Liechtenstein	536
Japan	534
Canada	532
Belgium	529
Macao	527
Switzerland	527
Australia	524
New Zealand	523
Czech Republic	516
Iceland	515
Denmark	514
France	511
Sweden	509
Austria	506
Germany	503
Ireland	503
Slovak Republic	498
Norway	495
Luxembourg	493
Poland	490
Hungary	490
Spain	485
Latvia	483
<b>United States</b>	<b>483</b>

**FIGURE 5** Mean Achievement Scores in Math Literacy

Source: www.oecd.org, January 2011.

dawning of the new millennium, Japan, the United States, Germany, and Korea became increasingly competitive.

Figure 9 compares the productivity of automobile manufacturers in Japan, the United States, and Europe. In this chapter, the term *productivity* is used several times. In this context, the term should be viewed as “total factor productivity” (ratio of outputs to inputs from labor, capital, materials, and energy). The graph compares the average hours required by the most productive plants to produce one automobile. Japanese plants located in Japan are able to produce an automobile in an average of 15 hours. European manufacturers require more than twice that much time. Such U.S. manufacturers as General Motors, Ford, and Chrysler require an average of 20 hours per automobile. Japanese manufacturers with assembly plants in the United States using U.S. workers, such as Mazda, average 19 hours per automobile. Because hourly wages in Europe tend to be higher than those in Japan

Mean Achievement in Science Literacy	
Country	Science Literacy
Finland	548
Japan	548
Hong Kong	539
Korea	538
Liechtenstein	525
Australia	525
Macao	525
Netherlands	524
Czech Republic	523
New Zealand	521
Canada	519
Switzerland	513
France	511
Belgium	509
Sweden	506
Ireland	505
Hungary	503
Germany	502
Poland	498
Slovak Republic	495
Iceland	495
<b>United States</b>	<b>491</b>

**FIGURE 6** Mean Achievement Scores in Science Literacy

Source: www.oecd.org, January 2011.

and the United States, European firms operate at a double competitive disadvantage. European and U.S. firms are nibbling away at these productivity differences to the point that the gap between the best and worst producers is slowly but steadily closing.

Another area in which Japanese firms have gained a competitive advantage is product development. The *product development cycle*—the time it takes to turn an idea into a finished product—is typically shorter in Japan than in the United States and Europe. This allows Japanese firms to get new products to the market faster. Japanese automobile manufacturers take an average of 2 years to complete the product development cycle compared with more than 3 years for their competitors in the United States and Europe.

Another basis for comparison among automobile manufacturers is quality. Productivity gained at the expense of quality yields no competitive advantage. Figure 10 compares the major automobile-producing nations in terms of the average number of defects per 100 vehicles manufactured. The quality comparisons follow the same trends found in the earlier productivity comparisons. Japanese manufacturers average the fewest defects; European manufacturers average the most. American manufacturers find it difficult to compete in the global marketplace when their productivity and quality are

Mean Achievement in Reading Literacy	
Country	Reading Literacy
Finland	543
Korea	534
Canada	528
Australia	525
Liechtenstein	525
New Zealand	522
Ireland	515
Sweden	514
Netherlands	513
Hong Kong	510
Belgium	507
Norway	500
Switzerland	499
Japan	498
Macao	498
Poland	497
France	496
<b>United States</b>	<b>495</b>

FIGURE 7 Mean Achievement Scores in Reading Literacy

Source: www.oecd.org, January 2011.

Advanced Problem-Solving Skills	
• Korea.....	70% plus
• Japan.....	70% plus
• Finland.....	70% plus
• Germany.....	58%
• Czech Republic.....	58%
<b>AVERAGE 52%</b>	
• Ireland.....	51%
• Russia.....	43%
• United States.....	42%

FIGURE 8 Percent of Students with Advanced Problem-Solving Skills

Source: www.oecd.org, January 2011.

not up to international standards—a situation that must be reversed if the United States is to regain the preeminent position it has historically enjoyed in the world community.

Even a cursory examination of key economic indicators raises concerns. The ability of a country to compete in the manufacturing arena is a direct determinant of its quality of life. Manufacturing created the great American

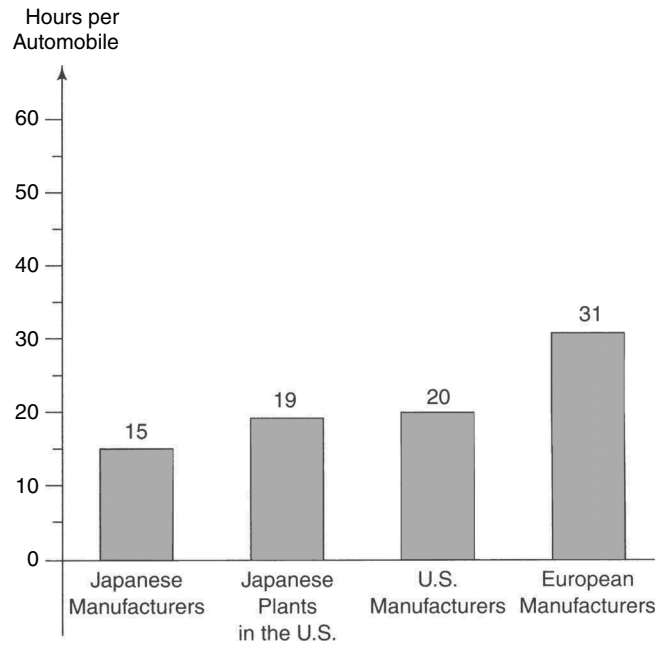


FIGURE 9 Comparative Productivity of Automobile Manufacturers (Most Productive Plants)

Source: Congress of the United States, Office of Technology Assessment, 2011.

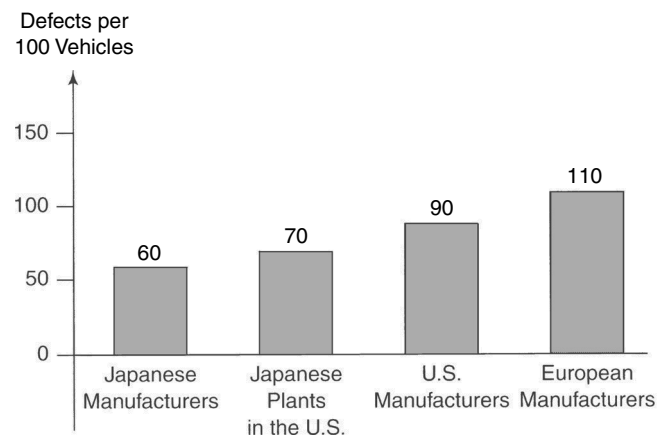


FIGURE 10 Comparative Defect Frequency among Automobile Manufacturers

Source: Congress of the United States, Office of Technology Assessment, 2011.

middle class. If the manufacturing sector dwindles because it cannot compete globally, the middle class dwindles correspondingly. Figure 11 contains a number of facts that indicate what has happened to the U.S. economy during the years since World War II. These are the years in which U.S. manufacturers have steadily lost ground to foreign competition.

Do these comparisons mean that U.S. manufacturers cannot compete? The answer is no. American manufacturers were slow to respond to the international quality revolution. However, in the 1980s and into the new millennium, the realization that quality coupled with productivity

**FIGURE 11** Selected Economic Indicators

Source: The Management Institute, *Global Update* (May 2011), 12–13.

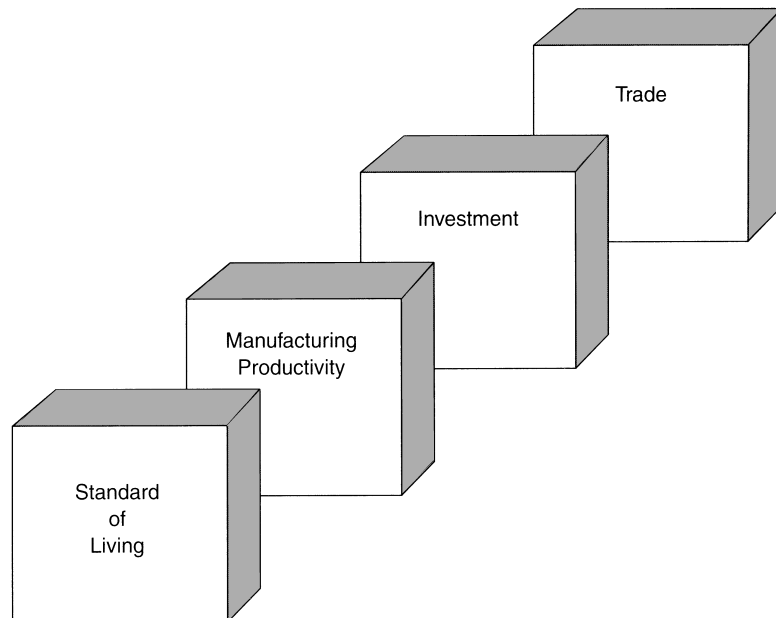
- Today 29% of children born in the United States will live in poverty. Forty years ago it was approximately 12%.
- The top 1% of income earners in the United States accounted for 60% of the total income increase realized in 2010.
- In 2010, the top 1% of the wealthiest U.S. citizens had as many assets as 93% of the poorest U.S. citizens.
- The real hourly wage of a worker in the United States today is 17% less than it was in 1979.
- Today the United States has the most unequal distribution of wealth of any industrialized country in the world.

was the key to winning global competition caused many U.S. firms to begin adopting the approach set forth in this text while simultaneously pushing for change in areas beyond their control (i.e., cost of capital, industrial policy, etc.). As the total quality approach continues to gain acceptance, companies in the United States are closing the competitiveness gap.

### COMPARISONS OF INTERNATIONAL COMPETITORS

According to a report published by the World Economic Forum, the United States has reclaimed its place as the most competitive country in the world community.<sup>3</sup> This is good news, since the United States had slipped to fifth place during the 1990s. This means that in spite of the poor performance of students in the United States when compared with the performance of students in other industrialized nations, the United States has managed to improve in the areas of standard of living, manufacturing productivity, investment, and trade, which are critical indicators of national competitive status (Figure 12).

**FIGURE 12** Critical Indicators of National Competitive Status

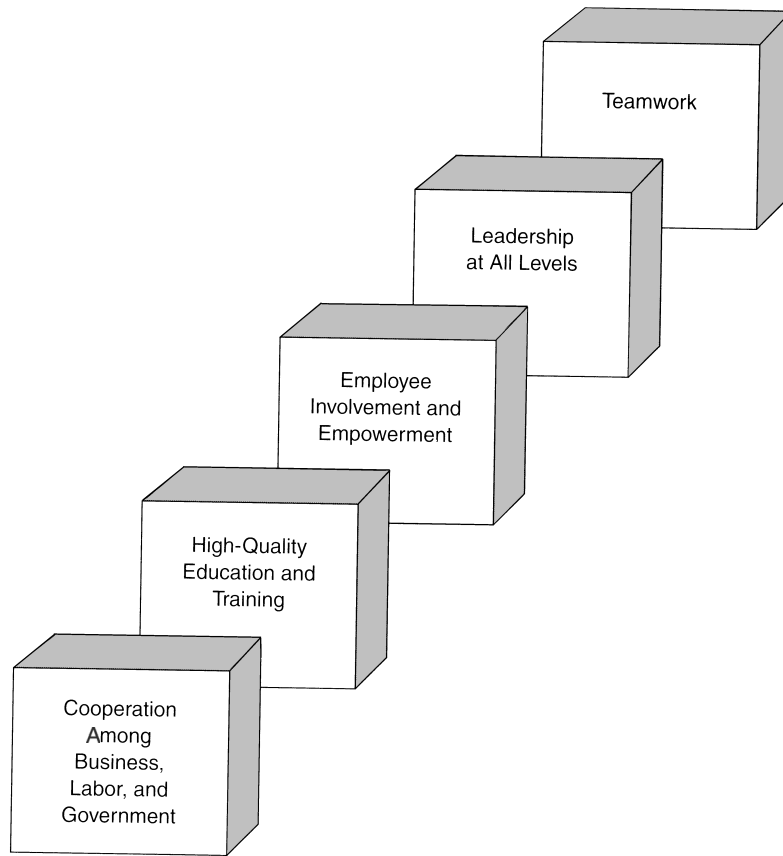


### HUMAN RESOURCES AND COMPETITIVENESS

The point is made continually throughout this text that the most valuable resources for enhancing competitiveness are human resources. The truth of this point becomes apparent if one studies the approach taken by Germany and Japan to rebuild from the rubble of World War II. Both countries were devastated. Being left with only one real resource, the human resource, Germany and Japan were forced to adopt an approach that used this resource to the greatest possible advantage.

The German and Japanese systems are not perfect, nor are they infallible. They are examples of approaches that work as well as any other two systems can in a continually changing and unsure global marketplace. Further, they make wise and effective use of human resources.

Business, government, and labor leaders in the United States could learn a great deal from Germany and Japan. People often respond to suggestions that such study might be helpful by claiming that the culture of the United States is so different that what works in these countries won't



**FIGURE 13** Strategies for Human Resource Competitiveness in Japan and Germany

work in the United States. Such thinking misses the point entirely: few countries could be more different from one another than Japan and Germany, yet the approaches to competitiveness adopted by these countries are strikingly similar (see Figure 13).

### CHARACTERISTICS OF WORLD-CLASS ORGANIZATIONS

It is often said that only “world-class” organizations can compete in the global marketplace. But what is a world-class organization? In an attempt to answer this question, the American Management Association (AMA) conducted a global survey.<sup>4</sup> According to this survey, the following are the top 15 areas in which organizations are concerned about doing well as they attempt to compete in the global marketplace:

1. Customer service
2. Quality control and assurance
3. Research and development/new product development
4. Acquiring new technologies
5. Innovation
6. Team-based approach (adopting and using effectively)
7. Best practices (study and use of)
8. Manpower planning
9. Environmentally sound practices
10. Business partnerships and alliances

11. Reengineering of processes
12. Mergers and acquisitions
13. Outsourcing and contracting
14. Reliance on consulting services
15. Political lobbying

Of the 15 areas listed in the survey, several are directly associated with the larger issue of quality. Customer service, quality control and assurance, innovation, team-based approach to work, partnerships and alliances, and reengineering of processes are all topics that figure prominently in any discussion of total quality.

In addition to these issues, the AMA survey found that respondents were concerned about a number of human resources topics. The 10 most important of these are as follows:

1. Worker productivity (improvement)
2. Employee training and development
3. Open communication between management and employees
4. Employee benefits and perquisites
5. Codes of workplace conduct
6. Conflict resolution
7. Employee satisfaction
8. Flextime arrangements
9. Management–employee–union relations
10. Child care



**QUALITY TIP ▼****Lesson from Toyota's Quality Problems**

Few companies are more closely associated with quality than Toyota. With the assistance of W. Edwards Deming, Toyota pioneered the quality revolution that helped transform Japan from a bombed out shell of a country following World War II into an economic superpower. However, as events have proven, even a quality giant such as Toyota can stumble. Following a serious damage to its image and also to its profit/loss statement caused by a succession of product recalls, Toyota began to tackle the difficult task of winning back its lost credibility with customers and the general public. Along the way, Toyota's leadership learned a valuable lesson about how to recover from a quality crisis. That lesson was this: *when fixing the problems, focus on the needs of your customers.* Toyota knew that just recalling cars and fixing the problems would not be sufficient. Consequently, the car maker offered a variety of incentives to entice Toyota owners to bring their cars in for the necessary repairs. Then the company paid for all repairs and parts. It also provided discounts and extended warranties as options available to customers. This was a responsible way to get past the crisis. However, the real issue is whether Toyota will identify and correct the root cause of the recall problems. Doing so will be the key in determining if the Japanese auto giant can fully and permanently recover from its problems. This is the most important lesson to learn from Toyota's recall crisis.

Once again, the AMA survey identified numerous quality-related concerns and functions that organizations must do well if they hope to compete globally. Worker productivity, employee training and development, codes of workplace conduct, conflict resolution, employee satisfaction, and management–employee–union relations are all total quality-related topics.

**World-Class Manufacturing: What It Takes**

Organizations in business sectors ranging from banking to commercial transportation attempt to compete on a global scale. The most prominent of these come from the manufacturing sector. World-class manufacturers are those that consistently provide superior value (quality, cost, and service) for customers. The methods of world-class manufacturers are summarized in the following subsections:

**Competitive Analysis Strategies** In the area of competitive analysis, world-class manufacturers use the following methods to compare themselves with the competition for the purpose of improving their own performance: cost efficiencies in operations, speed to market, research and development supremacy, rapid delivery from suppliers, first-class delivery logistics, zero defects, real-time order management, seamless integration with sales and marketing, close to zero inventory, and networked or collaborative operations. By applying these criteria to themselves and their competitors, world-class manufacturers determine where their performance is and where it needs to be in order to compete globally.

**Production and Supply Chain Strategies** In the area of production and supply chain strategies, world-class manufacturers use the following methods to stay ahead of the competition: collaborative planning, forecasting, and replenishment; collaborative manufacturing and product design; direct delivery of materials to point of use; supplier-managed inventory; and use of channel-assembly distributors. Other manufacturers also use these strategies to varying degrees. Ultimate manufacturers stay ahead of the competition by using them extensively.

**Customization Strategies** In the area of customization strategies, world-class manufacturers use the following methods: building to order, mass production that is configured for individual customers, configuring to order (linking sales operations to production schedules), one-to-one customization for customers in real time, and global sourcing and manufacturing. As with the other strategies, it is not just the fact that ultimate manufacturers use these customization methods that makes them world class; it is the extent to which they use them.

**Electronic Commerce Strategies** In the area of electronic commerce strategies, world-class manufacturers use the following methods: supply management, buying, auctioning, Internet ordering, status and availability tracking by Internet, and accepting Internet orders from customers. World-class manufacturers use electronic commerce strategies almost twice as often as their competitors. In addition, these world-class organizations are on track to increase their use of electronic commerce over the next 5 years at a rate well beyond the projected rates of competitors.

**Compensation Systems** In the area of compensation systems, world-class manufacturers use the following methods as benchmarks for rewarding and recognizing managers and employees: product profitability, inventory levels, manufactured/delivered costs per unit, worker productivity, level of customer satisfaction, manufacturing cycle time, cost efficiencies in operations, employee retention rates, speed of response to market demands, percent of revenues from new products, total delivered cost per unit, zero defects, percent of costs saved from strategic outsourcing, integration of functions across the organization, economic value added, and percent of products from strategic alliances. Figure 14 contains a brief checklist of minimum performance benchmarks that manufacturers must be able to meet in order to compete in the global marketplace.

**MANAGEMENT-BY-ACCOUNTING: ANTITHESIS OF TOTAL QUALITY**

In too many businesses, accounting trumps quality. Often, managerial accounting becomes the tail that wags the dog—a questionable approach to doing business in a highly

Performance Measures	World-Class Benchmarks
Quality Rejects per Million Parts	< 10
Utilized Capacity	90%
Breakdown Losses	1%
On-Schedule Production	Targeted
Design Producibility	100%
Design Meets Cost Target	95%
Engineering Change Process Response Time	1 day
Annual Training Days per Employee	20

**FIGURE 14** To Compete in the Global Marketplace, Manufacturers Must Consistently Exceed These Benchmarks

Source: International Finance Center, Washington, DC.

competitive environment. When managerial accounting becomes management-by-accounting, quality inevitably suffers. Management-by-accounting amounts to focusing solely on an organization’s financial performance rather than managing the factors that most affect financial performance (e.g., people, process, and product quality).

The most obvious problem with management-by-accounting is that it leads to short-term thinking and short-term decision making. According to this approach, one of the fastest ways to improve financial performance in the short run is to ignore investing in continual improvement that are necessary to remain competitive in the long run. The practices like (1) keeping people trained and well-equipped; (2) employing best practices to keep processes operating at peak performance levels; and (3) maintaining world-class quality in all aspects of an organization’s operations cost money in the short run but pay off in the long run. In other words, total quality is a long-term concept while management-by-accounting is a short-term concept.

One of the many reasons why companies fall into the management-by-accounting trap is that many CEOs come from a finance-related background, the most common college degree among the American CEOs being an MBA—a degree with a strong finance orientation. To avoid such ideological pitfalls, all business-related degrees need to include a more thorough study of quality. It is also why more quality professionals need to put themselves on the “CEO track” in their professions. Consider the following problems that result from the application of management-by-accounting:

- Management-by-accounting leads to decision making by analysis of financial spreadsheets rather than by consideration of the factors that lead to organizational excellence and world-class quality.
- Management-by-accounting encourages short-term cost cutting instead of long-term improvements to quality, value, and competitiveness.
- Management-by-accounting leads to narrowly-focused leadership of companies based solely on short-term financial considerations rather than broader thinking that encompasses all factors that contribute to organizational excellence and make a company competitive.

The master’s of business administration degree, or MBA, is an excellent credential. So are the various other under-

graduate and graduate degrees available from colleges and universities in the United States. It is the concept of focusing excessively on the score rather than the game—management-by-accounting—that is being questioned by quality advocates, not any specific degree. Management-by-accounting is an approach to management, not an academic credential.

As anyone knows, both the game and the score are important. We advocate a blending of the principles of quality management with the curricula of business, engineering, technology, and management programs. Students pursuing a degree in any of these disciplines should learn the principles of quality management set forth in this text as well as their traditional curriculum content. This will ensure that they know how to continually improve both performance and the score.

## U.S. COMPANIES: GLOBAL STRENGTHS AND WEAKNESSES

As business continues the current trend toward globalization, how are companies in the United States faring? A business trying to compete in the global marketplace is like an athlete trying to compete in the Olympics. Nowhere is the competition tougher. Correspondingly, no country in the world gives its businesses such a solid foundation from which to work. The following factors account for a country’s ability to compete in the international marketplace:

1. An economy that is open to foreign investment and trade
2. A government that minimizes controls on business but does a good job of supervising financial institutions
3. A judicial system that works well and helps reduce corruption
4. Greater transparency and availability of economic information
5. High labor mobility
6. Ease of entry by new businesses

In varying degrees, the United States meets all of these criteria. Of course, how well these criteria are fulfilled is a matter of debate between and among various interest groups and stakeholders. Nonetheless, when compared with other countries competing in the global marketplace, the United States fares well in all of these key areas. This being the case,