EIGHTH EDITION

Quality Management for Organizational Excellence

INTRODUCTION TO TOTAL QUALITY

DAVID L. GOETSCH STANLEY B. DAVIS

QUALITY MANAGEMENT FOR ORGANIZATIONAL EXCELLENCE

Introduction to Total Quality

Eighth Edition

David L. Goetsch

Stanley B. Davis

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PREFACE

BACKGROUND

At one time in history, Great Britain was the world's leader in commerce and industry. Eventually, the United States emerged as a major friendly competitor. Then, following World War II, the United States took over as the undisputed world leader of commerce and industry. During these postwar years, while the United States was enjoying unparalleled prosperity, Japan and Germany were rebuilding from the ashes of the war. With a great deal of help from the United States, Japan was able to rebound and during the 1970s began to challenge the United States in such key manufacturing sectors as automobiles, computers, and consumer electronics. By 1980, Japan had emerged as a world-class competitor and a global leader in selected areas of commerce and industry. German industry had also reemerged by this time. By 2000, Korea, China, and the Pacific Rim nations had also emerged as global competitors.

As a result, the United States found itself losing market share in economic sectors it had dominated (and taken for granted) for decades. At first, industrialists in the United States turned their backs on the lesson their counterparts in other industrialized nations had learned. This lesson was that the key to competing in the international marketplace was to simultaneously improve quality and productivity on a continual basis. However, as more and more market share slipped away, the message started to sink in for the United States. This belated awareness gave rise to a quality movement that began to take hold. Its progress was slow at first. However, an approach to doing business known as quality management has caught on and is now widely practiced as a way to achieve organizational excellence. Organizational excellence is a combination of peak performance, superior quality, and continual improvement.

This book advocates an approach to doing business that focuses all the resources of an organization on the continual and simultaneous improvement of quality and productivity. The purpose of this approach is to continually improve the organization's performance and, in turn, competitiveness.

WHY WAS THIS BOOK WRITTEN AND FOR WHOM?

This book was written in response to the need for a practical teaching resource that encompasses all of the various elements of quality management, including Lean, Six Sigma, and Lean Six Sigma, and pulls them together in a coherent format that allows the reader to understand both the big picture and the specific details of quality management. It is intended for use in universities, colleges, community colleges, corporate environments, and any other settings in which people want to learn to be effective agents of quality management. Students enrolled in technology, engineering, and management programs will find this book both valuable and easy to use. Practitioners in corporate settings will find it a valuable guide in understanding and implementing quality management.

The direct, straightforward presentation of material focuses on making the theories and principles of quality management practical and useful in a real-world setting. Up-to-date research has been integrated throughout in a down-to-earth manner.

ORGANIZATION OF THIS BOOK

The text consists of 22 chapters, organized in two parts. Part 1 explains the philosophy and concepts of quality management. Part 2 covers the tools and techniques of quality management. A standard format is used throughout the book. Each chapter begins with a list of objectives and provides a comprehensive summary. Key terms and concepts, factual review questions, a critical thinking activity, discussion assignments, and endnotes are found at the end. The endnotes provide readers with comprehensive lists of additional reading and research material that can be pursued at the discretion of the student and/or the instructor. The other materials encourage review, stimulate additional thought, promote discussion, and facilitate additional research.

USING THIS BOOK FOR ONE COURSE OR TWO

Some professors use this book for one course and some use it for two courses. Those who use the book for one course cover all or most of the chapters and make decisions concerning any chapters that are not covered on the basis of local considerations. Those who use the book for two courses typically cover Chapters 1–14 in the first course and Chapters 15–22 in the second course. Although this approach to dividing the content is not balanced in terms of the number of chapters, it is balanced in terms of the time required to cover the material. Feedback from most professors indicates that the degree of difficulty of the content of Chapters 15–22 requires them to spend more time on these chapters than is required to cover any of the first 14 chapters. Consequently, in terms of time requirements, dividing the book at Chapter 14 results in two courses of equal length. Feedback from the classroom has been positive concerning both of these approaches.

HOW THIS BOOK DIFFERS FROM OTHERS

Most books in the market deal with one of the several elements of quality management, such as teamwork, just-in-time manufacturing, scientific measurement (SPC or quality tools), continual improvement, and employee involvement. Many of the books available were developed with the advanced-level practitioner in mind rather than the beginner. Few of the books in the market were formatted for use in a classroom setting. This book was written to provide both comprehensive and in-depth coverage of quality management. All the elements of quality management are covered, including several that receive little or no attention in other quality management books (e.g., peak performance, continual improvement, superior value, partnering, manufacturing networks, quality culture, and how to implement total quality). These subjects are covered in sufficient depth to allow a beginner to learn everything necessary to understand and implement total quality without having to look to any other source of information.

New in the Eighth Edition

The eighth edition contains major improvements that reflect the ongoing evolution of quality management, as well as recommendations from reviewers and users of the text. These improvements include the following:

- Provided an explanation in the preface, explaining how the book can be used for one comprehensive course on quality management or to cover two courses that go into even more detail.
- Enhanced the entire artwork package so that figures are more meaningful from a teaching and learning perspective.
- Critical-thinking activities were updated as appropriate.
- The entire text has been made compatible with electronic formats for use in e-books and other data-formats.
- The overall explanation of total quality was updated to reflect current thought in the field and a section was added explaining how quality and competitiveness relate to overall job satisfaction and financial benefits.
- A section on managing quality in the supply chain was added.
- Information on the new ISO 9000:2015 was added.
- Sections on Lean, Lean Six Sigma, QFD, SPC, JIT, and benchmarking were expanded and updated.

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David L. Goetsch is the vice president emeritus and professor at Northwest Florida State College. Prior to entering higher education full time, Dr. Goetsch had a career in the private sector that included positions in quality management, safety management, and project management with engineering, manufacturing, and construction firms. He currently serves on the Board of Directors of Fort Walton Machining Company, Inc. Dr. Goetsch is the founder of The Quality Institute, a partnership of Northwest Florida State College and the Okaloosa Economic Development Council, and the Leadership Institute of Northwest Florida State College. Dr. Goetsch has been selected as Professor of the Year at Northwest Florida State College and the Emerald Coast Campus of the University of West Florida (five times). He was selected as Florida's Outstanding Technical Instructor of the Year and his program at Northwest Florida State College was selected as the recipient of the U.S. Secretary of Education's Outstanding Technical Program in the United States for Region 10.

Stanley B. Davis was a manufacturing executive with Harris Corporation until his retirement in 1992. He was the founding managing director of The Quality Institute and is a well-known expert in the areas of total quality management and its implementation, statistical process control, just-in-time manufacturing, Six Sigma, benchmarking, quality management systems, and environmental management systems. He currently serves as professor of quality at the institute and heads his own consulting firm, Stan Davis Consulting, which is dedicated to assisting private industry and public organizations throughout North America achieve world-class performance and competitiveness.

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PART ONE

PHILOSOPHY AND CONCEPTS

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CHAPTER ONE

THE TOTAL QUALITY APPROACH TO QUALITY MANAGEMENT: ACHIEVING ORGANIZATIONAL EXCELLENCE

LEARNING OBJECTIVES

After completing this chapter, you should be able to:

- Define the term *quality*.
- Compare and contrast *quality* and *total quality*.
- Summarize the two views of quality.
- Describe the key elements of total quality.
- Identify the pioneers of total quality.
- Explain the keys to success with total quality.
- Analyze the future of quality management in the twenty-first century.
- Explain how to become certified in quality management.

The concept of total quality 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 the foundation for the study of all remaining chapters.

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 shopping groceries, 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:

- Performance that meets or exceeds expectations.[1]
- Performance that meets the customer's needs.[2]
- Consistently meeting customer needs and expectations.[3]
- Satisfying the customer today and getting better tomorrow.[4]

In his landmark book *Out of the Crisis*, quality pioneer W. Edwards Deming makes the point that quality must be defined from the perspective of the stakeholder. The customer has a stake in the quality of a product or service, the production workers have a stake in it, and the organization that employs the production worker has a stake in it. Each of these entities should have their own view of quality and all of their views should mesh.[5]

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.[6] 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:[7]

- 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.

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*. The authors define total quality as follows:

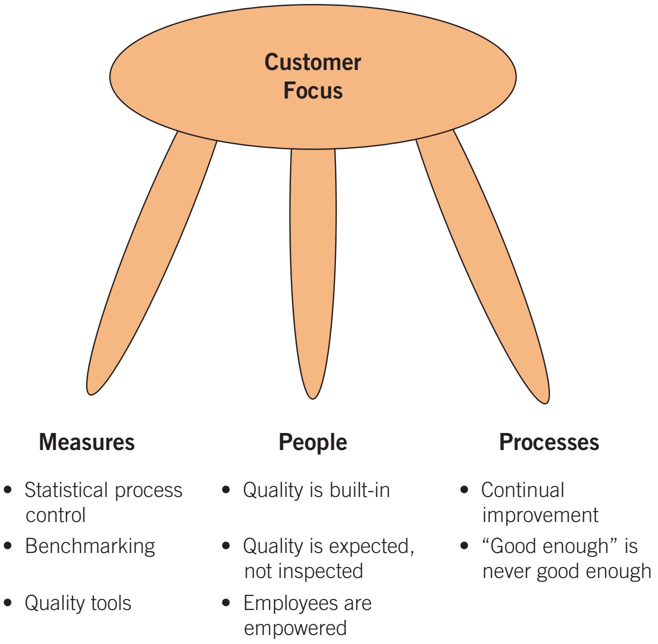
Customer Focus
Measures
People
Processes
• Statistical process control
• Benchmarking
• Quality tools
• Quality is built-in
• Quality is expected, not inspected
• Employees are empowered
• Continual improvement
• "Good enough" is never good enough

FIGURE 1.1 Three-Legged Stool of Total Quality.

An easy way to grasp the concept of total quality is to consider the analogy of a three-legged stool, as shown in Figure 1.1. 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 1.2. Notice that the first part of the definition in Figure 1.2 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: strategically based, customer focus (internal and external), obsession with 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. The underlying concept that drives the need for total quality is *competitiveness*. Although pride of product (or service) is a philosophical driver of the total quality concept—organizations that produce a product or provide a service should want it to represent them in a way they can be proud of—the practical driver is competitiveness. In today's globally competitive business environment, organizations

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 1.2 Total Quality: What It Is and How It Is Achieved.

cannot survive, much less thrive, unless they outperform the competition in proving superior value. And quality is an essential ingredient in superior value (quality, cost, service). The individual characteristics relating to total quality shown in Figure 1.2 are 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 1.1 is a time line 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

TABLE 1.1 100 Years of Selected Historic Milestones in the Global Quality Movement

Prior to 1906–1908	All autos assembled by skilled craftsmen called "Fitters." Time req'd. to complete a Ford Fitter's task was 8.56 hours.
1906	Cadillac achieves perfect interchangeability of parts.
1908	Ford attains perfect part interchangeability, eliminating the need for skilled craftsmen. Time req'd. for a Ford "Assembler" to complete his assigned task: 2.3 minutes.
1913	Ford introduces the moving assembly line, reducing the Assembler's task time to 1.9 minutes.
1924	Shewhart identifies causes of process variation as common and special, and develops the statistical process control (SPC) chart.
1927	Deming meets Shewhart, and sees the relevance of his ideas to management.
1931	Shewhart publishes his book *Economic Control of Quality of Manufactured Products*.
1939	Start of World War II
1941	Deming teaches SPC to American wartime production workers. SPC widely used.
1945	End of World War II
1946	SPC fades in America as pent-up demand for manufactured goods seems boundless.
1950	Deming trains hundreds of Japanese engineers, managers, executives, and scholars in SPC and quality concepts.
1950	Eiji Toyoda & Taiichi Ohno start development of the Toyota Production System (TPS). Continues to this date.
1954	Juran conducts quality management courses in Japan.
1960s & 1970s	Japan captures market share from Western manufacturers. U.S. loses some market segments completely.
1980	NBC Airs TV documentary, "If Japan Can, Why Can't We?" Brings attention to Japanese success with quality and to Deming. American industry begins to learn from Japan.
1981	Ford and GM invite Deming to speak to executives. Ford listened better than GM.
1982	Deming publishes *Quality, Productivity, and Competitive Position*, his philosophy of management based on his "Fourteen Points."
1985	Beginning of adoption of total quality management by American organizations.
1987	U.S. Congress establishes the Malcolm Baldrige National Quality Award. Motorola introduces Six Sigma as a more powerful version of TQM.
1988	U.S. Dept. of Defense endorses TQM, causing DoD contractors to follow suit.
1990	"Lean Production" as a definition of the Toyota Production System is used by the book *The Machine That Changed the World*.
1993	TQM is widely taught in U.S. colleges and universities.
2000	ISO 9000, the International Standard for Quality, was rewritten to incorporate TQM concepts.
2010	TQM/Lean/Six Sigma generally acknowledged worldwide as the management system of the twenty-first century, and are practiced by organizations across the planet.
2020	Global competitiveness makes total quality a business imperative in all industrialized nations of the world.

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 engineering, in turn, resulted in the use of statistical methods in the control of quality, which eventually led to the concepts of *control charts* and *statistical process control*, which are now fundamental aspects of the total quality approach.

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.

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 ten 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 1.2. 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 several 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 1.1.

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

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.

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.

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. Deming's contribution was his ability to see the big picture, envision the impact of quality on it, and meld different management philosophies into a new, workable, unitary whole. More than any other quality pioneer, Deming is responsible for the *total quality* approach.

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 lifelong 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. corporations felt little need for his help. Corporations from other countries were equally uninterested. However, attitudes toward Deming's idea were changed by World War II. The need to rebuild after the devastation of World War II, particularly in bombed-out Japan, brought Deming's ideas on quality to the forefront.

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.

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.[8]

The Deming Cycle Summarized in Figure 1.3, 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).

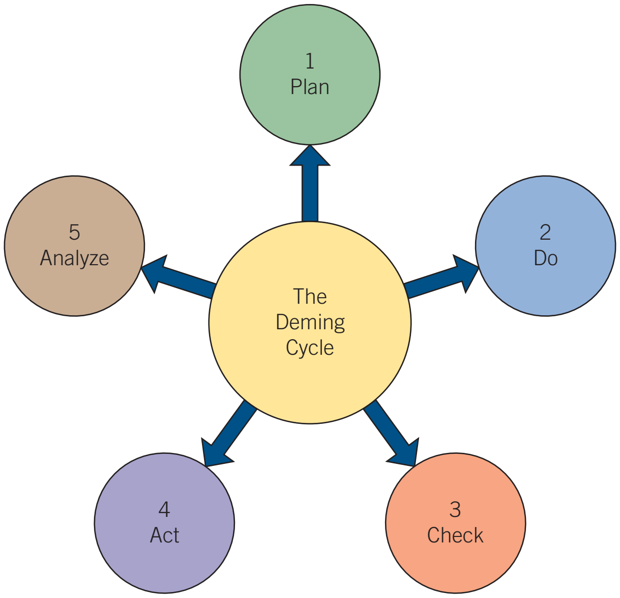

FIGURE 1.3 The Deming Cycle.

Deming's Fourteen Points Deming's philosophy is both summarized and operationalized by his Fourteen Points, which are contained in Figure 1.4. 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 repeatedly in his later years that if he had it all to do over again, he would leave off the numbers.

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 qualilty 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 1.4 Deming's Fourteen Points.