Managing *for* Quality *and* Performance Excellence

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Managing for Quality *and* Performance

TENTH EDITION

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Managing for Quality and Performance Excellence, Tenth Edition
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Brief Contents

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Preface

This book focuses on three main concepts: the foundation principles of quality management; tools and techniques to drive and support design, control, and improvement of quality; and the organizational view of performance excellence as reflected by the Malcolm Baldrige Criteria. So why is quality still vital to America and the world? The American Society for Quality (ASQ) monitors news items reported in the press. What types of stories do we find? Food safety and toy recalls, health care, the automotive industry, and various product glitches dominate. Indeed, quality—or lack of quality—is a vital issue in everyone's life. Quality is relevant and important for today's students and future business leaders, as well as those already in the workforce. Today's business and nonprofit organizations need to capitalize on the knowledge and "lessons learned" that excellent organizations have acquired.

The first nine chapters in this book provide a solid foundation in the principles of quality management. We remain firmly committed to the principles and practices of the Baldrige Performance Excellence framework, which has been characterized as "the leading edge of validated management practices," by a former chair of the Baldrige Panel of Judges. We feel that one of the best ways of obtaining such knowledge is from the national role models that have emerged from the Baldrige program in the United States and similar programs throughout the world. We continue to use Baldrige as the fundamental framework for organizing and presenting key issues of performance excellence in Chapters 10 through 14.

CHANGES IN THE TENTH EDITION

- The tenth edition of *Managing for Quality and Performance Excellence* continues to embrace the fundamental principles, criteria, and historical foundations of total quality, while providing a foundation for understanding and applying technical tools and performance excellence from an enterprise perspective. All chapters have been carefully edited and updated where appropriate to provide the most current coverage available.
- We have added two new Excel templates for the Taguchi loss function and system reliability calculations to facilitate problem solving.
- We have also replaced several *Quality Profiles* and *Quality in Practice* cases with more recent and relevant material. These profiles and QIP cases emphasize the importance of quality in the global economy.
- We also added twelve new cases and revised approximately one-third of the numerical end-of-chapter problems.

Some highlights that continue from the previous edition include:

- Student-friendly layout highlighting important concepts
- Student Companion Website materials that include summaries of key points and terminology, data files, Excel templates and examples, and various materials relating to the Baldrige Award Program
- Text coverage of most of the body of knowledge (BOK) required for ASQ certification as a Certified Quality Manager

ORGANIZATION

Part I focuses on the principles of quality; Part II concentrates on technical tools and techniques, and Part III focuses on performance excellence and the Baldrige Criteria. This organization provides the instructor with considerable flexibility by focusing on both managerial and technical topics for audiences ranging from undergraduate students to MBA students or executives.

Part I provides an introduction to quality management principles.

- Chapter 1 introduces the notion of quality, definitions, its history and importance, the role of quality in manufacturing and service, and its impact on competitive advantage and financial return.
- Chapter 2 explores the foundations of modern quality management from the perspectives of Deming, Juran, and Crosby, and summarizes the fundamental principles of quality management. This chapter also discusses variation and statistical thinking, quality management systems, and ISO 9000.
- Chapters 3, 4, and 5 focus on the three core principles of quality: customers, the workforce, and processes. Each of these chapters builds on key concepts that are reflected in the quality management literature and the Baldrige Criteria, but does so independently from Baldrige, which is addressed in Part III.

Part II focuses on the technical issues underlying quality design, control, and improvement.

- Chapter 6 focuses on statistical tools and methods.
- In Chapter 7 we focus on quality in product design and the variety of tools and techniques that support it.
- Chapter 8 introduces process measurement provides a basic coverage of statistical process control (SPC).
- Chapter 9 focuses on process improvement and introduces Six Sigma in a unified fashion.

Part III is all about organizational quality, Baldrige, and implementation.

- Chapter 10 introduces the Baldrige framework and criteria, as well as international quality and performance excellence programs.
- In Chapter 11, we provide a strategic focus on quality, and discuss strategic planning, organizational design, and strategic work system design.
- Chapter 12 focuses on the use of data and information to measure and manage organizational performance. This chapter includes discussion of balanced scorecards and modern approaches to knowledge management.
- Chapter 13 discusses leadership for quality, both from a practical and theoretical perspective, and also includes an updated section on governance and societal responsibilities.
- The final chapter, Chapter 14, deals with building and sustaining high-performance organizations.

Features and Pedagogy to Enhance Learning

Each chapter begins with featured Quality Profiles of two role-model organizations. Most of these organizations are Baldrige recipients. Quality Spotlight boxes identify examples of

unique organizational practices, and icons in the margin indicate that extensive supplementary materials may be found on the accompanying Student Companion website.

In each chapter, *Quality in Practice* case studies describe real applications of the chapter material. They reinforce the chapter concepts and provide opportunities for discussion and more practical understanding. Many of the case studies are drawn from real, published, or personal experiences of the authors.

End-of-chapter materials for each chapter include Review Questions, which are designed to help students check their understanding of the key concepts presented in the chapter. Chapters in Parts I and II also have Discussion Questions that are open-ended or experiential in nature, and designed to help students expand their thinking or tie practical experiences to abstract concepts. As appropriate, Problems are designed to help students develop and practice quantitative skills. Most chapters have a section entitled Projects, Etc. that provides projects involving field investigation or other types of research. Finally, each chapter includes several cases, which encourage critical thinking through application of quality concepts to unstructured or comprehensive situations.

Flexibility for Teaching

The text is designed to support different types of courses. For example, an undergraduate course in quality management might focus on basic quality principles, tools, and techniques covered in Chapters 1 through 9, with perhaps an introduction to performance excellence and the Baldrige Criteria in Chapter 10 and a brief discussion of material in Chapters 11 through 14. An MBA course focusing on the managerial aspects of quality might begin with Chapters 1 and 2, introduce the Baldrige framework in Chapter 10, and then cover chapters 3, 4, 5, and 11 through 14 with perhaps some brief discussions of tools and techniques in Chapters 6 through 9.

Student Companion Site

The student companion site for this book contains summaries of key points and terminology for each chapter, Excel templates, datasets, and more. To get free access to these materials, go to www.cengagebrain.com, and search for this book by its title.

Instructor Resources

Cengage Learning Testing Powered by Cognero® is a flexible, online system that allows you to: import, edit, and manipulate content from the text's test bank or elsewhere, including your own favorite test questions; create multiple test versions in an instant; and deliver tests from your LMS, your classroom, or wherever you want.

Instructor Resource Website: Place all of the key teaching resources you need conveniently at your fingertips with this all-in-one source for planning, teaching, grading and assessing student understanding and progress. To access the instructor resource website, visit www.cengagebrain.com and search for this book by its title. In addition to the quality management strengths, insights into the Baldrige Award, Six Sigma, and ISO 9000 found within this edition, you can access a rich array of teaching and learning resources at the interactive companion website. You can easily download password-protected teaching resources, including brief videos highlighting winning practices of Baldrige award winners, the full Instructor's Manual/Solutions Manual with teaching suggestions and answers to all cases and problems in the text, Test Bank in Word and Exam-View® computerized format, and PowerPoint® presentation slides, and other materials whenever

you need them to support your course. This edition includes a set of Instructor Reserve problems from the problem-solving chapters, which instructors can use for in-class demonstrations of problem-solving techniques or for student "workshop" sessions. For chapters with numerical problems, PowerPoint versions of selected problems from the end-of-chapter and Instructor Reserve sets are also provided.

Media Links: We have added a list of links to YouTube videos for Baldrige-recipient company resources and other quality-related topics. These can be used in the classroom and for student assignments to enhance understanding of how quality concepts are put into practice.

Note on Company References and Citations

In today's ever-changing business environment, many companies and divisions are sold, merged, or divested, whereas others have declared bankruptcy, resulting in name changes. For example, Texas Instruments Defense Systems & Electronics Group was sold to Raytheon and is now part of Thales Raytheon Systems Company, and AT&T Universal Card Services was bought by CitiBank (which is now CitiGroup). Although we have made efforts to note these changes in the book, others will undoubtedly occur after publication. In citing applications of quality management in these companies, we have generally preserved their original names to clarify that the practices and results cited occurred under their original corporate identities.

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We are extremely grateful to all the quality professionals, professors, reviewers, and students who have provided valuable ideas and comments during the development of this and previous editions.

Many people deserve special thanks for their contributions to development and production of the book. Our regards go to our now retired senior acquisitions editor Charles McCormick, Jr., who oversaw the development of this book for many editions, our new product manager Aaron Arnsparger, content developer Conor Allen, managing production editor Jennifer Ziegler, and Richard Fenton, Mary Schiller, and Esther Craig, our previous editors at West Educational Publishing, and our long-time, now-retired developmental editor at Thomson Higher Education Division, Alice Denny.

Quality expert Joseph Juran was asked in an interview in 2002 what advice he would give to someone just starting out in quality today. He replied, "I would start out by saying 'Are you lucky!' Because I think the best is yet to be. In this current century, we are going to see a lot of growth in quality because the scope has expanded so much … away from manufacturing to all the other industries, including the giants: health care, education, and government." We will continue to do our best to improve this book in our quest for quality and to spread what we truly believe is a fundamentally important message to current and future generations of business leaders. We appreciate any and all feedback about the book. Feel free to contact us at the email addresses below.

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PART 1

Principles of Quality

H. James Harrington, columnist for *Quality Digest* magazine and one of the leading quality management consultants in the world, lamented the lack of a true quality focus in the United States and around the world, from both organizational and personal perspectives. He observed

> *From where I stand, CEOs around the world have lost much of their interest in quality … we are more interested in reducing cost, removing waste, and reducing cycle time … Maybe it's time we got back to basic quality measurements. We talk about getting to the root cause of problems. Well, I think we need to get to the root results of our actions by measuring the level of customer satisfaction improvement, the increase in mean time to failure, reducing percent defective during the first 90 days of usage, stopping product recalls, and lowering return rates—not dollars saved, inventory turns, or output per hour. We are trying to do everything for everybody, and as a result we are missing the real quality objective—better and better products and services.*
>
> *We need to take pride in what we do. When you go home at night and look in the mirror, will you able to smile and say, "I did my very best"? Too many of us stop short of being our best. We say, "That's good enough," never knowing how good we could be … To make up for these sloppy work habits, we are using information technology to offset the lack of interest in the job and the lack of commitment to the organization … What we need to do is get back to basics. The things that made us great in the first place are hard work, pride in accomplishment, technical education, and strong family values.*[1]

Does quality matter to you personally as a consumer and future employee or manager? We certainly hope so, because that is what this book is about. While poor quality can be a source of irritation and frustration to you as a consumer, it can be costly to businesses (and investors) in the form of product recalls or lost customers. Poor quality can be lethal—on April 20, 2010, BP's Deepwater Horizon drilling rig exploded due to poor quality cement around the well that contractors failed to test in order to save time and money. The explosion killed 11 people, led to the largest environmental disaster in U.S. history, and cost BP $10 billion. It would have taken only 10 hours and cost only $128,000 to check the cement. General Motors' faulty ignition switches, which made front-page news a few years ago, resulted in at least a dozen deaths and a massive recall. Sadly, we continually read about quality problems in manufacturing, health care, and other industries.

Quality has become a vital component of every modern organization and will remain an important part of a continual quest for improving performance across the globe. The economic welfare and survival of businesses and nations depend on the

quality of the goods and services they produce, which depend fundamentally on the quality of the workforce and management practices that define their organization. Joseph Juran, one of the most respected leaders of quality in the twentieth century, suggested that the past century will be defined by historians as the century of productivity, and the current century has to be the century of quality. "We've made dependence on the quality of our technology a part of life."[2]

Building and maintaining quality into an organization's goods and services, and more importantly, into the infrastructure of the organization itself is not an easy task. If it were, there would be little need for this book. As a member of the emerging generation of business leaders, you have an opportunity and a responsibility to improve the quality of your organization and society at large, not just for products and services, but in everything you say and do.

Part 1 introduces the basic concepts of quality. Chapter 1 discusses the definition and history of quality, and the impact of quality on competitive advantage and business results. Chapter 2 describes the foundations of modern quality management—the philosophies on which modern concepts of quality are based, the key principles of quality management, and ISO 9000, which provides a basis for a solid quality management system. Chapters 3, 4, and 5 focus on each of the three core principles of quality: customer focus, workforce focus, and process focus.

NOTES

1. H. James Harrington, "Are We Going Astray?" *Quality Digest*, Feb. 2008; "The Decline of U.S. Dominance—Part 1," *Quality Digest*, April 2008; "The Decline of U.S. Dominance—Part 2," *Quality Digest*, May 2008. www.qualitydigest.com. Reprinted with permission.
2. Thomas A. Stewart, "A Conversation with Joseph Juran," *Fortune*, January 11, 1999, 168–169.

CHAPTER

1

Introduction to Quality

OUTLINE

Quality is by no means a new concept in modern business. In October 1887, William Cooper Procter, grandson of the founder of Procter & Gamble, told his employees, "The first job we have is to turn out quality merchandise that consumers will buy and keep on buying. If we produce it efficiently and economically, we will earn a profit, in which you will share." Procter's statement addresses three issues that are critical to managers of manufacturing and service organizations: *productivity*, *cost*, and *quality*. Productivity (the measure of efficiency defined as the amount of output achieved per unit of input), the cost of operations, and the quality of the goods and services that create customer satisfaction all contribute to profitability. Of these three determinants of profitability, the most significant factor in determining the long-run success or failure of any organization is quality. Some 125 years later, this sentiment was

echoed by the Conference Board, which concluded from a survey of more than 700 CEOs and executives from around the world that quality is uniquely positioned to accelerate organizational growth through better execution and alignment, and it also provides the voice of the customer critical to developing innovative products and services.[1]

High-quality goods and services can provide an organization with a competitive edge. A reputation for high quality generates satisfied and loyal customers who reward the organization with continued patronage and favorable word-of-mouth advertising, often resulting in new customers. In contrast, the consequences of failing to adequately address quality can be devastating. Consider Toyota Motor Company: Toyota developed an impeccable reputation for high quality and low cost through relentless attention and continuous improvement of its production processes. The Camry became the best-selling car in America, and by 2008 Toyota overtook General Motors in global sales. But in 2009, a series of "unintended acceleration" incidents, including one involving a Lexus ES 350, led to $2 billion in recalls to replace floor mats and gas pedal assemblies. Other defects involving antilock braking systems, the wire cables holding spare tires, and vehicle software were soon uncovered, resulting in additional recalls and even suspended sales of eight popular models. As one columnist noted, "No matter how rigorous an automaker's development process might be, there's still potential for problems with quality or reliability."[2] The problem extended beyond engineering into the underlying management processes of the company. Newspaper articles accused the company of hiding defects that they knew about for many years. Toyota quickly lost its credibility and trustworthiness. Despite the fact that the company was later exonerated, with no finding of design flaws in their braking systems, the damage was done. Akio Toyoda, grandson of the company's founder, stated, "We maybe slacked in some of our core principles [like] attention to the basics of manufacturing…. We're working hard to fill those gaps … and secure the confidence of our customers."[3] To refocus on quality, Toyota appointed a chief quality officer and an advisory panel on safety, and restructured its reporting system to better communicate defect issues. As this case suggests, quality is vital to products (goods and/or services) as well as the management processes and systems that produce and deliver them.

At the beginning of each chapter we profile two "role-model" organizations, most of which are recipients of the Baldrige Award (also known as the Malcolm Baldrige National Quality Award). The Baldrige Award recognizes outstanding U.S. organizations that have highly effective management practices that lead to superior business results; we will learn more about it in Part III of this book. These examples will help you understand some of the approaches and cultural factors that are characteristic of organizations that have pursued a strategy of quality and performance excellence.

The mandate for focusing on quality is clear and simple. In working with Chrysler Corporation to improve quality several decades ago, a vice president of the United Auto Workers (UAW) succinctly stated the importance of quality: "No quality, no sales. No sales, no profit. No profit, no jobs." The role of quality is recognized in many organizations with senior executives in charge of quality at the highest levels of management. For instance, Apple created a new position—Senior Vice President of Operations Dedicated to Product Quality—whose responsibility is to ensure that Apple's products meet "the highest standards of quality."[4]

In this chapter, we introduce the notion of quality. We discuss how it is defined, historical developments, its importance in business and in building and sustaining competitive advantage, and the role of quality in manufacturing, service, and business systems.

quality**profiles**

Motorola, Inc. and PricewaterhouseCoopers Public Sector Practice

Motorola, Inc. was a household name and a recognized leader in quality for a long time. Like many other companies, Motorola has had its share of difficulties in tough competitive technology markets and economic environments, and as a result, has made many changes in its business operations, existing today as two divisions: Motorola Mobility, which provides communication products for the consumer market, and Motorola Solutions, which provides mission-critical communications products and services to enterprises and governments.

Motorola was a leader in the U.S. quality revolution during the 1980s and was one of the first organizations to receive the Baldrige Award in 1988. It built its culture on two key beliefs: respect for people and uncompromising integrity. Motorola was a pioneer in continual reduction of defects and cycle times in all the company's processes, from design, order entry, manufacturing, and marketing, to administrative functions. Employees in every function of the business measure defects and use statistical techniques to analyze the results. Products that once took weeks to make are now completed in less than an hour. Even the time needed for closing the financial books has been reduced; what used to take a month was shortened to only four days by applying quality principles.

Throughout its history, Motorola's maintained a focus on quality. In 2002, the Commercial, Government, and Industrial Solutions Sector (CGISS) also received a Baldrige Award. CGISS was recognized around the world for its environmental, health, and safety efforts. Customers reported high levels of satisfaction, and the division demonstrated strong financial, product quality, cycle time, and productivity performance. These results came from exceptional practices in managing human assets, sharing data and information with employees, customers, and suppliers, and aligning all its business processes with key organizational objectives.

PricewaterhouseCoopers Public Sector Practice (PwC PSP) was formed in 2005 and is one of 17 business units of PwC. Key customers are the U.S. federal government and state and local governments. PwC PSP provides business advisory services, including risk consulting, management consulting, and technology consulting. The company has four strategic goals focused on profit, workforce, customers, and operations. These goals are aligned to strategic objectives, strategic advantages, strategic challenges, short- and long-term plans, and performance projections/targets. PwC PSP aligns its workforce into a framework that delivers value to clients while encouraging individual staff career and leadership development. PwC PSP uses its formal Pursuit process to systematically capture business and engage customers. Pursuit integrates methods by which staff can better listen to potential, current, and former customers at various points in each relationship.

These and other approaches have yielded impressive results. Scores rating PwC PSP as "exceptional" or "very good" increased from 50 percent in fiscal year 2008 to levels at or near 100 percent for fiscal years 2010 through 2014. Net Promoter System (NPS; a tool for measuring and comparing customer engagement and loyalty discussed in Chapter 3) survey scores have been 50 or higher in all markets since fiscal year 2012. These scores are equal to or better than NPS scores for some of the most respected companies in the country. Workforce turnover has decreased each year since fiscal year 2009, from approximately 22 percent to 13 percent—a rate that is considerably better than the industry average of 20 percent.

Source: Adapted from Baldrige Award Recipient Profiles, National Institute of Standards and Technology, U.S. Department of Commerce.

DEFINING QUALITY

Quality can be a confusing concept, partly because people view quality subjectively and in relation to differing criteria based on their individual roles in the production-marketing value chain. In addition, the meaning of quality continues to evolve as the quality profession grows and matures. Neither consultants nor business professionals agree on a universal definition. The *Quality Improvement Glossary* defines quality as "a subjective term for which each person has his or her own definition."[5] For example, one study that asked managers of 86 firms in the eastern United States to define quality produced several dozen different responses, including the following:

1. Perfection
2. Consistency
3. Eliminating waste
4. Speed of delivery
5. Compliance with policies and procedures
6. Providing a good, usable product
7. Doing it right the first time
8. Delighting or pleasing customers
9. Total customer service and satisfaction[6]

Thus, it is important to understand the various perspectives from which quality is viewed in order to fully appreciate the role it plays in the many parts of a business organization. Quality can be defined from six different perspectives: *transcendent, product, value, user, manufacturing*, and *customer*.[7]

Transcendent (Judgmental) Perspective

One common notion of quality, often used by consumers, is that it is synonymous with superiority or excellence. In 1931, Walter Shewhart, who was one of the pioneers of quality control, first defined quality as the goodness of a product. This view is referred to as the *transcendent* (*transcend*, "to rise above or extend notably beyond ordinary limits"), or judgmental, definition of quality. In this sense, quality is "both absolute and universally recognizable, a mark of uncompromising standards and high achievement."[8] Common examples of products associated with an image of excellence are Rolex watches, Ritz-Carlton hotels, and Lexus automobiles. From this perspective, quality cannot be defined precisely—you just know it when you see it. It is often loosely related to the aesthetic characteristics of products that are promoted by marketing and advertising. Product excellence is also often associated with higher prices. However, high quality is not necessarily correlated with price. Just consider the case of a Florida man who purchased, albeit quite some time ago, a $262,000 Lamborghini only to find a leaky roof, a battery that quit without notice, a sunroof that detached when the car hit a bump, and doors that jammed![9]

Excellence is abstract and subjective, and standards of excellence may vary considerably among individuals. Hence, the transcendent definition is of little practical value to managers. It does not provide a means by which quality can be measured or assessed as a basis for practical business decisions.

Product Perspective

Another definition of quality is that it is related to the *quantity* of some product attribute, such as the thread count of a shirt or bed sheet, or the number of different features

in an automobile or a cell phone. This assessment implies that larger numbers of product attributes are equivalent to higher quality, so designers often try to incorporate more features into products, whether the customers want them or not. As with the transcendent notion of quality, the assessment of product attributes may vary considerably among individuals. Thus, good marketing research is needed to understand what features customers want in a product.

User Perspective

Individuals have different wants and needs and, hence, different expectations of a product. This leads to a user-based definition of quality—*fitness for intended use*, or how well the product performs its intended function. Both a Cadillac CTS and a Honda Civic are fit for use; they simply serve different needs and different groups of customers. If you want a highway-touring vehicle with luxury amenities, then a Cadillac may better satisfy your needs. If you want a vehicle for commuting in a congested urban environment, a Civic might be preferable.

Nissan Motor Company Ltd.'s early experience in the U.S. market provides an example of applying the fitness-for-use concept.[10] Nissan tested the U.S. market in 1960. Not wanting to put the Nissan name on a very risky venture, they decided to use the name Datsun on all cars and trucks sold in North America. Although the car was economical to own, U.S. drivers found it to be slow, hard to drive, low-powered, and not very comfortable. In essence, it lacked most of the qualities that North American drivers expected and was not "fit for use." The U.S. representative, Mr. Katayama, kept trying to understand customer needs and providing feedback to the designers. For some time, his company refused to believe that U.S. tastes were different from its own. After many years of nagging, Mr. Katayama finally got a product that Americans liked, the sporty 1970 240Z. Eventually, the Nissan brand name replaced Datsun. Car enthusiasts will know that Nissan in 2002 reintroduced a modern version of this classic vehicle, currently the 370Z.

A second example comes from a U.S. appliance company whose stoves and refrigerators were admired by Japanese buyers. Unfortunately, the smaller living quarters of the typical Japanese home lack enough space to accommodate the U.S. models. Some could not even pass through the narrow doors of Japanese kitchens. Although the products' performance characteristics were high, the products were simply not fit for use in Japan.

Value Perspective

A fourth approach to defining quality is based on *value*; that is, the relationship of product benefits to price. Consumers no longer buy solely on the basis of price. They compare the quality of the total package of goods and services that a business offers (sometimes called the *customer benefit package*) with price and with competitive offerings. The customer benefit package includes the physical product and its quality dimensions; presale support, such as ease of ordering; rapid, on-time, and accurate delivery; and postsale support, such as field service, warranties, and technical support. If competitors offer better choices for a similar price, consumers will rationally select the package with the highest perceived quality. If a competitor offers the same quality package of goods and services at a lower price, customers would generally choose the one having the lower price. From this perspective, a quality product is one that provides similar benefits as competing products a lower price, or one that offers greater benefits at a

comparable price. A good example is generic pharmaceuticals, which usually provide the same medical benefits at a lower price.

Competing on the basis of value became a key business strategy in the early 1990s. Procter & Gamble, for example, instituted a concept it called *value pricing*—offering products at "everyday" low prices in an attempt to counter the common consumer practice of buying whatever brand happens to be on special. In this way, P&G hoped to attain consumer brand loyalty and more consistent sales, which also provided significant advantages for its manufacturing and distribution systems.

Competition demands that businesses continually seek to satisfy consumers' needs at lower prices. The ability to keep prices low requires a strong internal focus on efficiency and quality, as quality improvements in operations generally reduce costs by reducing scrap and rework. Thus, organizations must focus on continually improving both the consumer benefit package and the quality and efficiency of their internal operations.

Manufacturing Perspective

Consumers and organizations want consistency in goods and services. When you frequent a Chipotle restaurant, you expect the same amount of ingredients and taste in every burrito. For the Coca-Cola Company, quality is "about manufacturing a product that people can depend on every time they reach for it," according to Donald R. Keough, former president and chief operations officer. Through rigorous quality and packaging standards, Coca-Cola strives to ensure that customers will enjoy the taste of its products anywhere in the world. Service organizations likewise strive for consistency in performance; The Ritz-Carlton Hotel Company, for example, seeks to ensure that its customers will have the same quality experience at any of their properties around the world.

Having standards for goods and services and meeting these standards leads to the fifth definition of quality: *conformance to specifications*. **Specifications** are targets and tolerances determined by designers of goods and services. Targets (formally called *nominal specifications*) are the ideal values for which production is to strive; tolerances are necessary because it is impossible to meet targets all of the time. In manufacturing, for example, a part dimension might be specified as "0.236 $\pm$ 0.003 cm." These measurements would mean that the target, or ideal value, is 0.236 centimeters, and that the allowable variation (tolerance) is 0.003 centimeters from the target. Thus, any dimension in the range 0.233 to 0.239 centimeters would conform to specifications. Likewise, in services, "on-time arrival" for an airplane is typically defined as being within 15 minutes of the scheduled arrival time. The target is the scheduled time, and the tolerance is specified to be 15 minutes. Specifications are meaningless, however, if they do not reflect attributes that are deemed important to the consumer. This definition provides an unambiguous way to measure quality and determine if a good is manufactured or a service is delivered as it was designed.

Customer Perspective

The American National Standards Institute (ANSI) and the American Society for Quality (ASQ) standardized official definitions of quality terminology in 1978.[11] They defined quality as *the totality of features and characteristics of a product or service that bears on its ability to satisfy given needs*. This definition draws heavily on the product and user definitions and is driven by the need to create satisfied customers. By the end of the 1980s, many organizations had begun using a simpler, yet powerful,

customer-based definition of quality that remains popular today: *meeting or exceeding customer expectations*.

To understand this definition, one must first understand the meanings of "customer." Most people think of a customer as the ultimate purchaser of a product or service; for instance, the person who buys an automobile for personal use or the guest who registers at a hotel is considered an ultimate purchaser. These customers are more precisely referred to as **consumers**. Clearly, meeting the expectations of consumers is the ultimate goal of any business. Before a product reaches consumers, however, it may flow through a chain of many firms or departments, each of which adds some value to the product. For example, an automobile engine plant may purchase steel from a steel company, produce engines, and then transport the engines to an assembly plant. The steel company is a supplier to the engine plant; the engine plant is a supplier to the assembly plant. The engine plant is thus a customer of the steel company, and the assembly plant is a customer of the engine plant. These customers are called **external customers**.

Every employee in an organization also has **internal customers** who receive goods or services from suppliers within the organization. An assembly department, for example, is an internal customer of the machining department, and a person on an assembly line is an internal customer of the person who performs the previous task. Most businesses consist of many such "chains of customers." Thus, the job of any employee is to satisfy the needs of their internal customers, or the entire system can fail. This focus is a radical departure from traditional ways of thinking in a functionally oriented organization. It allows workers to understand their role in the larger system and their contribution to the final product. (Who are the customers of a university, its instructors, and its students?)

Customer-driven quality is fundamental to high-performing organizations. For instance, Hilton Hotels Corp. implemented its Ultimate Service program, which trains employees to anticipate guest needs, personalize service, and if necessary, deal with complaints quickly and seamlessly in an effort to ensure high levels of customer satisfaction. Hilton also uses rigorous inspections and satisfaction loyalty tracking surveys.[12]

Integrating Quality Perspectives in the Value Chain

Individuals in different business functions—for example, the designer, manufacturer or service provider, distributor, or customer—speak different "languages." Thus, different quality perspectives at different points in the value chain are important to ultimately create and deliver goods and services that will satisfy customers' needs and expectations. To understand this more clearly, examine Figure 1.1, which shows the essential elements of a value chain in manufacturing for developing, producing, and distributing goods to customers. The customer is the driving force for the production of goods and services, and customers generally view quality from either the *transcendent* or the *product perspective*. The goods and services produced should meet customers' needs and expectations. It is the role of the marketing function to determine these. Hence, the *user perspective* of quality is meaningful to people who work in marketing.

The manufacturer must translate customer requirements into detailed product and process specifications. Making this translation is the role of research and development, product design, and engineering. Product specifications might address such attributes as size, form, finish, taste, dimensions, tolerances, materials, operational characteristics, and safety features. Process specifications indicate the types of equipment, tools, and facilities to be used in production. Product designers must balance performance and cost to meet