

chapter **seven**

QUALITY CONTROL AND CONTINUOUS IMPROVEMENT

“Quality is everyone’s responsibility.”

W. Edwards Deming



Any supervisor working in a profitable company today will tell you how important quality is to its bottom line. It is a simple fact that without a high level of quality, the company’s days are numbered. Manufacturing plants and service organizations, large or small, throughout the country and world have embraced a quality-minded philosophy.

Competitive, world-class organizations are committed to producing high-quality products and providing high-quality services. Top management recognizes the critical need for the merger of a sound quality philosophy with the production of goods and services. Globalization, foreign competition, and rising prices of raw materials due to diminishing natural resources combine to make quality one of the foremost goals in modern industry. The level of quality directly impacts the amount of waste and rework a company experiences. Waste and rework increase costs and thus consume profits. Eliminating waste also has a positive effect on our environment. It takes less energy and material when quality rises. Quality is every employee’s responsibility.

A BRIEF OVERVIEW OF QUALITY

The push for higher quality has revolutionized the way business is conducted. Theories and philosophies have been developed and disseminated throughout the world. Three of the best-known and widely published quality gurus are W. Edwards Deming, who outlined his now-famous Fourteen Points to achieving quality¹; Philip Crosby and his Quality Management Grid²; and Joseph Juran, who proposed a universal way of conceptualizing quality control and quality improvement, which he called the Quality Trilogy.³ The tremendous impact of these

PERFORMANCE COMPETENCIES

After you have finished reading this chapter, you should be able to:

- Explain management’s responsibilities in leading a quality system
- Describe how quality affects productivity, as well as employee and customer satisfaction
- Explain three reasons why supervisors are often in the best position to champion training programs
- Explain confirming signs and negating signs and describe the exchange rate between the two
- Explain and facilitate simple process improvement efforts for your team

American pioneers in quality control is incalculable. Collectively, their philosophies have literally changed the fundamental values of industries throughout the world. These philosophies share the belief that improvement is a never-ending process, and that training in quality control should be open to employees at all levels.

This revolution in quality in the United States has its roots in efforts to standardize production methods for the military during World War II, and continued in response to the emphasis on quality and resultant competition from Japan, particularly in the automotive and electronics industries in the 1970s. In addition to Deming, Juran, and Crosby and their contributions, a number of quality methodologies, programs, and standards for measuring quality have developed and are used, to varying degrees, in industry to present. These include:

Total Quality Management (TQM). TQM is a people-focused management system that focuses on increasing customer satisfaction while continually reducing costs. Although it uses scientific methods for assessing quality and associated costs and constraints and implementing improvement, it takes a total systems approach in which all functions, processes, and departments across the organization, and all employees at all levels, are integral to ensuring success in the manufacture of products or delivery of services. TQM stresses learning and adaptation to continual change as essential to achieving this success.

Six Sigma. The term *Six Sigma* was coined by Motorola as its methodology for improving business processes by minimizing defects and refers to the statistical measurement indicating there are only 3.4 defects out of every 1 million opportunities to produce a defect, or virtually zero. It is an organizational approach where companies make decisions based on data, seek roots of problems, define defects based on customer requirements, and track leading indicators of problems to prevent them from happening.

Lean Production. *Lean production* refers to the continuous flow of products or services to the customer at the moment it is needed and to the customer's specifications. It focuses on increasing productivity and quality while reducing inventory and shortening lead time from floor to customer. Its principles include workplace safety, order, and cleanliness; just-in-time production; built-in Six Sigma quality; empowered teams; visual management to track performance and provide immediate feedback on a daily or even hourly basis; and continual pursuit of perfection.⁴

International Standards Organization Quality Management Standards. The International Standards Organization (ISO) has developed a series of quality management standards that support the quality philosophy. Specifically, it has developed a set of five such standards, ISO 9000–9004. The American National Standards Institute (ANSI) and the American Society for Quality Control (ASQC) developed the ANSI/ASQC Q9000–Q9004. In addition, specific standards also exist for automotive, aerospace, and telecommunications industries and for environment management. These standards have been revised over the years, and organizations must continually address these revisions. Organizations competing in the global market must achieve the quality levels dictated by these standards.

In addition to these and other programs and methodologies, a number of prestigious national and international quality awards are available to which companies apply and compete to be recognized for their commitment to world-class

quality. These awards include the Malcolm Baldrige National Quality Award, the European Quality Award, and the Deming Prize, Japan's highest quality award. The standards for receipt of these awards are high and the review process is rigorous. For example, to receive the Malcolm Baldrige National Quality Award, recipients must have demonstrated performance excellence in seven categories: leadership; strategic planning; customer and market focus; measurement, analysis, and knowledge management; workforce focus; process management; and results. Malcolm Baldrige National Quality Awards are awarded to organizations involved in manufacturing, small business, service, education, and healthcare.⁵

The quality movement in the United States is pervasive and extends beyond manufacturing industries and includes areas like service, healthcare, education, and government. For professionals involved in these and other industries, the most prominent professional organization to which they can belong is the American Society for Quality (ASQ) (formerly the American Society for Quality Control). ASQ provides its members with the latest information on quality standards, processes, and procedures. It also offers a curriculum of courses that lead to a certification in quality control. Supervisors should seriously consider joining this organization. Supervisors who earn a certificate in quality control greatly increase their value to their employers. This translates into increased income, advancement, and career satisfaction.

MANAGEMENT COMMITMENT TO THE QUALITY PROCESS

The various philosophies, programs, methodologies, and awards discussed promote a common goal of developing an integrated total quality system by engaging in continuous improvement. They also share the belief that managers and supervisors play an enormously critical role in achieving and maintaining high standards of quality.



To illustrate this point, all fourteen points in Deming's philosophy pertain to the managers. According to Deming, workers, management, vendors, and investors are on the same team. It is management who creates the culture of worker "ownership" of the improvement process. Management creates the culture that enables workers to feel comfortable enough to recommend changes. Management develops the strategic plan for implementing the quality initiative. Through their plan, resources necessary to fund the process of change are allocated. Additional investments in tools, machinery, equipment, and materials might have to be made. Quality parts cannot be produced on worn-out or obsolete equipment. Training is integral to individual performance. Employees must know exactly what to do. Training is ongoing. It starts when employees are hired and continues throughout their time with the company. There are sizable indirect costs associated with training that the organization must absorb. For example, training will impact the quantity of production. It may suffer as workers leave their workstations to receive classroom training or when they meet regularly with their process improvement team. Significant improvements come from well-trained employees.

It is vital that management personnel face up to their responsibility. They must plan for the added costs that improvements will bring. It is equally important that managers model the proper attitude. Enthusiasm is contagious and management must demonstrate their commitment beyond funding. They must demonstrate enthusiasm for the process. The continuous improvement process inevitably brings many changes and management's reaction to change will be watched and monitored by the workers. Workers' attitudes and willingness to embrace the process will be influenced chiefly by the example management sets.

NEGATING AND CONFIRMING SIGNS OF MANAGEMENT COMMITMENT

While management may implement quality management programs, it is not always committed to them. Management shows signs of its commitment through its slogans, its talk throughout the organization about quality principles, the training it provides supervisors and employees, its continuous improvement teams (CITs), and other efforts. Yet, in some organizations, managers may say they value quality, but their behavior says something quite different. When management behaves incongruently in this fashion, employees will believe the behaviors and not the slogans and words. Managers who say one thing and do another are bound to fail.

Let us consider a story that illustrates clearly what can happen when managers try to fool their employees into thinking they value something when they really don't.

Twelve production (non-management) employees from the same manufacturing plant voluntarily gathered together in a nearby college classroom one Saturday morning at the urging of Leonard, one of their peers. He was taking a supervision class at the college and informed them about a series of public lectures given by a well-known professor at the college regarding various topics. The subject for this session was about how managers communicate their values to employees. After introductions, the professor began a conversation by asking the participants to tell him what they thought their managers valued. He recorded their responses on the white board under the heading:

Things our management values

Themselves

Profits

Customers

Product quality

Production quantity

The company's image and reputation

*The professor looked at the list and circled **Product quality**. He said that he was conducting research on quality and would like to ask them some questions about that item. His first question asked them how they knew their management valued product quality. They thought for a moment and gave him their responses, which he put on the board under the following heading:*

Confirming signs

Slogans and banners about quality hanging all around the plant

Conducting line inspections and having a quality control department

Holding products to tight tolerances and specifications

Not shipping a bad part

Frequent meetings of quality improvement teams

*He looked at the list for a moment and then asked them to tell him things that their management did **not value**. After a brief silence one of them shouted out, "**Product quality**." Almost instantly, the others agreed. The professor wrote their response under the heading:*

What our management does NOT VALUE

Product quality

The professor stepped back with a puzzled look on his face. He then pointed out to them that they had just contradicted themselves. Previously they said their managers valued quality, and now they said they don't. Several justified their response by explaining that their managers only say they value product quality, when in fact they really don't. They all seemed to agree that this was the case. The professor asked them how they knew that managers really did not value quality. He wrote their response on the board under the heading:

Negating signs

Management won't ship bad parts when there are only a few, but
if there are a thousand bad parts, they will ship them all in order
to meet their production quotas.

*The professor then asked that they look at the **Confirming Signs** list and at the **Negating Signs** list. After a moment, he asked them the following question: "How many negating signs does it take to wipe out all the confirming signs?" In unison, and much to their surprise, they said aloud,*

"ONE!"

The professor was astounded by their remark. He summarized what he had just witnessed. All those confirming signs that management communicated to them were wiped out or

negated by a single action—management’s decision to ship a thousand bad parts. They all agreed that the professor was correct. He pointed out to them that this is a very high exchange rate. In effect, one negating sign wiped out numerous, if not all, confirming signs. The professor then led them in a conversation that focused on the dangers of communicating negating signs. The employees discussed how they pay attention to the words and deeds of their leaders. Employees expect their leaders to behave in a congruent manner and, when they don’t, employees withhold respect and trust. They said they feel that management is lying to them and wonder what other lies their management is telling. They were confused by this duplicity and thought it quite unethical, immature, and totally unnecessary. They could not come up with any reasonable justification for their management’s behavior.

The exchange rate may not always be as high as it is in this example, but managers must be very mindful of the fact that employees pay attention to their behavior and will draw conclusions about the things valued by managers. Acting incongruently will bring negative consequences and the organization will suffer. Try to minimize communicating any negating signs. Supervisors should always strive to have their deeds match their words.

MANAGEMENT’S RESPONSIBILITIES

Quality is not just the responsibility of one person or one department in the organization as it once was. Today, everyone from the CEO to the production worker or service provider is directly responsible for quality. Supervisors play a key role in the success of any quality initiative. They serve the vital communications link between management and the employee. They must understand both the challenges of the workers and expectations of top management. The quality philosophy is set into motion by the workers under the leadership and guidance of their supervisor. Often, supervisors must coordinate and schedule regular in-service training sessions for their direct reports. It is imperative for supervisors to demonstrate a positive attitude toward training by encouraging all employees to take part. Training to gain skills in quality control must be a top priority for the supervisor. Their attitude and commitment to quality serves as the role model for all employees.

Employees are the fundamental asset of any company. They should be knowledgeable of all expectations placed on them. They must know exactly what is expected of them when it comes to quality. A clear idea of these expectations will create an environment where workers will take pride in their work, feel more secure, have high morale, and produce high levels of productivity. Very few employees desire to go to work and produce substandard products or provide substandard services. Having pride in one’s work is highly motivating. Workers must be trained in all aspects of quality improvement. Supervisors are often in the best position to champion training programs offered in and out of the company. They might be expected to train their employees. Supervisors directly help management create a climate for innovation and continuous improvement.

TOOLS FOR MEASURING QUALITY

Producing a quality product or providing a quality service that customers are willing to buy is not a new concept. However, using systematic record keeping and tracking quantitative data involving statistical principles are modern concepts.

Today's supervisor must be able to collect data and understand principles of data analysis. Supervisors need to be trained in statistical methods used in analyzing performance data. Supervisors are required to use many tools for measuring quality. Some of the more typical tools are check sheets to record patterns or trends for a product or service, Pareto diagrams for prioritizing problems based on their importance, flowcharts that show pictorially the sequence of events in a process, cause-and-effect diagrams that examine all possible causes for a quality defect, histograms that chart the frequency or number of occurrences of a particular aspect of a product or a process, control charts that monitor production as it occurs, and scatter diagrams that graph pairs of numeric data on two axes with one variable on each axis to determine the correlation between the variables. Extensive descriptions of these and other tools, their purpose and instructions for use are available on-line on the American Society for Quality's website.⁶ The objective of this chapter is not to teach you how to use these tools, but to emphasize their importance and to encourage supervisors to learn how to use these tools as soon as possible. They are fundamental quality control tools. Any supervisor who wishes to grow and prosper in today's organizations must comprehend how to use these concepts and integrate them into their daily work routine. Sign up for any type of quality training your company provides or any similar course your local college offers. They may offer a series of courses leading to a certificate in quality control.

IMPLEMENTING CONTINUOUS IMPROVEMENT IN YOUR TEAM

Although many quality improvement issues involve complex systems that impact numerous processes, functions, and departments within an organization, managers must also implement quality improvements at a much smaller scale within their work units. There are numerous issues involving work flow, customer service, communication, data management, and other matters that are solely within your team's purview that can make a big difference in enhancing the functioning of your team.

One tool you can use to implement continuous improvement in your team is the *plan-do-check-act model*, also called the *Deming Cycle* or the *Shewhart Cycle*. This model is described as⁷:

Plan: Identify an opportunity and plan for change.

Do: Implement the change on a small scale.

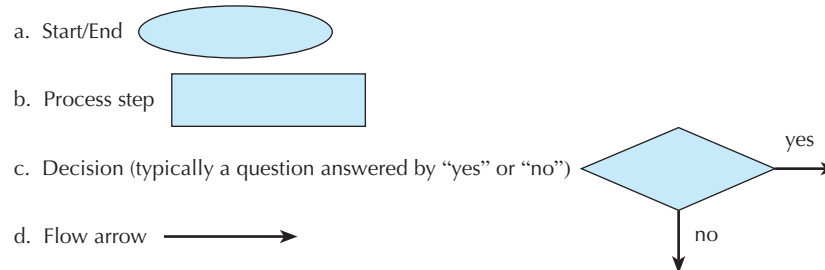
Check: Use data to analyze the results of the change and determine whether it made a difference.

Act: If the change was successful, implement it on a wider scale and continuously assess the results. If unsuccessful, begin the cycle again.

To engage in a continuous improvement effort with your team, consider these basic steps:

1. Assemble the team to identify a specific process issue requiring improvement.
2. Engage in processes to identify root causes of the problem. Many of the tools listed in this chapter may assist you to do this.

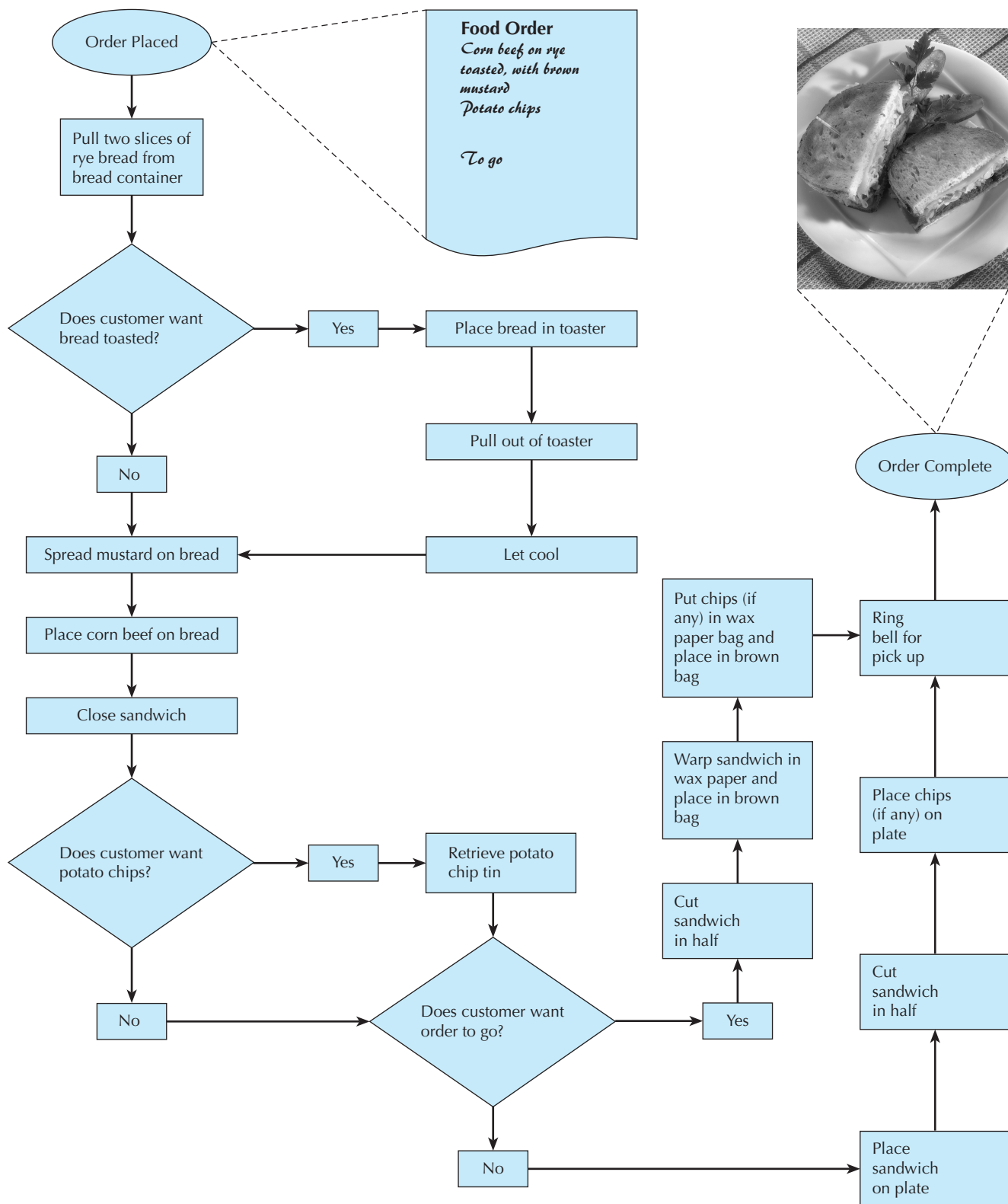
3. Chart the current process used. Typically, some form of flowcharting will assist you to do this. The most commonly used symbols in flowcharting are as follows:



To illustrate the basic flowchart process, the diagram that follows provides a rather exaggerated process that a short-order cook at a delicatessen might go through to prepare an order for a pastrami sandwich on rye with potato chips to go. Though flowcharting systems in your work are undoubtedly more complex than this, this example illustrates the many seemingly simple steps that must be accounted for when flowcharting. You must be careful to chart each step in order to identify whether each step is necessary or if some steps are redundant or otherwise unnecessary.

4. Chart the ideal process that the team envisions will improve the process. Typically, when compared to the current process, this will reveal the opportunity to eliminate steps that are redundant, time-consuming, or inefficient in other ways.
5. Agree on the ideal model and identify the barriers and bottlenecks that may prevent its implementation and discuss how to address them. Are there arbitrary policies, practices, and procedures that need to be corrected? Are there others outside the team who have some control or ownership over the current process with whom the team must negotiate? Are there impacts upstream or downstream that must also be addressed in order to realize this new model?
6. Determine who will address the barriers and bottlenecks identified, the timeline and deadlines for addressing them, and then proceed to address them.
7. Implement the change. Determine how you will measure the effectiveness of the change and evaluate the new process accordingly.
8. Check progress at the agreed-upon time. Make modifications as necessary. If change proves ineffective, return to the initial steps to identify causes and create a new ideal process. Note: If significant change is still needed beyond minor modifications, chances are that sufficient time was not spent to identify causes. For example, it is possible that the process itself is sufficient, but factors like personality clashes, lack of sufficient resources, or a lack of commitment among team members or others outside the team needed to implement the process are the true culprits of the inefficiencies.

Hypothetical Flowchart for Filling a Delicatessen Order





TOTAL QUALITY SYSTEMS ARE NO LONGER AN OPTION

A continuous quality improvement process requires accountability. Not only is management held accountable, but so is every employee. Accountability requires that you take personal responsibility for your actions and the consequences that they bring, good and bad. Frequent performance reviews, closer follow-up if a customer is unhappy, and almost zero tolerance when an imperfect product is placed prematurely in the hands of a customer or client are ways to foster accountability. People, processes, procedures, machinery, materials, and the vendors who provide them are all accountable for their quality. Causes for lapses in quality must be investigated in order to determine the causes. If it turns out that an employee's actions are the cause, he or she should be held accountable. The employee may need to be trained, reassigned to another job, or, if these do not correct the problem, removed from the position.

When Sylvia was hired and trained to do high-precision work in a high-tech factory, she was amazed to discover that she would go through a weekly performance review for

the first two months and a monthly review thereafter. The next thing she discovered was that quality standards had permeated the entire organization, and that her co-workers took great pride in the part they played in turning out the best possible product. After surviving her probation period, her supervisor said: "Sylvia, we are pleased to have you aboard. We are also pleased that your productivity is above average without sacrificing quality. I consider you to be a quality employee working for a quality outfit. Although our standards are high and there is always some pressure involved, you will discover that there is a lot of job satisfaction working here, and there are times when we relax and have a lot of fun."

The swing to quality while maintaining high quantity levels is the number one story in the world of business today. This change is primarily responsible for the success America is having in foreign markets. As a new supervisor, it is imperative that you evaluate just where your firm stands as far as quality is concerned. Is your company still in the talking stage? Have they adopted a workable plan? Or have they reached a high level of maturity in their ability to manage quality?

No matter what commitment your employer makes to quality, the commitment you make to yourself is the key to your future career success. If you are committed to getting your employees or team members to put customers first, producing the best product or service possible, and keeping improvements on a steady, consistent basis with frequent accountability, you are on the winning track. You will be playing the supervisory game under the best possible game plan.

PERFORMANCE CHECKLIST

1. The quality philosophies developed by quality gurus like W. Edwards Deming, Joseph Juran, and Philip Crosby; as well as programs and methodologies like TQM, Six Sigma, Lean Production, and the ISO 9000 Series; and national and international awards like the Malcolm Baldrige National Quality Award all promote a common goal of developing an integrated total quality system by engaging in continuous improvement. They share the belief that managers and supervisors play an enormously critical role in achieving and maintaining high standards of quality.
 2. Management shows signs of its commitment through its slogans, its talk throughout the organization about quality and quality principles, the training it provides supervisors and employees, its continuous improvement teams (CITs), and other efforts. Yet, in some organizations, managers may say they value quality but their behavior says something quite different. When management behaves incongruently in this fashion, employees will believe the behaviors and not the slogans and words. These are known as negating and confirming signs of management's commitment to quality.
- It only takes one negating sign to put into question management's true commitment.
3. Supervisors need to be trained in statistical methods used in analyzing performance data. Supervisors are required to use many tools for measuring quality. Some of the more typical tools are check sheets, Pareto diagrams, flow charts, cause-and-effect diagrams, histograms, control charts, and scatter diagrams.
 4. Supervisors can implement continuous improvement of processes within their team by utilizing the *plan-do-check-act model*. A practical process for doing this includes these steps: (1) assemble the team and identify the issue needing improvement; (2) identify root causes of the problem; (3) chart the current process using flowcharting; (4) chart the ideal process to identify steps that can be eliminated; (5) identify barriers and bottlenecks to realizing the ideal model; (6) address the barriers and bottlenecks; (7) implement the change; and (8) monitor the implementation, making modifications or returning to identify root causes if implementation is unsuccessful.

TEST YOURSELF

For each of the following statements, check true or false.

- | True | False | |
|-------|-------|---|
| _____ | _____ | 1. Having quantity receive preference over quality is desirable. |
| _____ | _____ | 2. Quality control is 100 percent a manufacturing function. |
| _____ | _____ | 3. A major training effort is necessary for a supervisor to improve quality in her or his department. |
| _____ | _____ | 4. Continuous improvement is a philosophy that never ends; that is, improvements need to be made on a steady, continuous basis. |
| _____ | _____ | 5. International companies are forcing some United States firms to adopt high-quality standards. |
| _____ | _____ | 6. The level of your personal commitment to quality will have little to do with your career success. |
| _____ | _____ | 7. Quality control can be applied not only to enhance your department's productivity, but also your career. |
| _____ | _____ | 8. An effective quality system focuses on customer needs and quality made products. |
| _____ | _____ | 9. One tool for continuous improvement is the <i>plan-check-do-act</i> model. |
| _____ | _____ | 10. If, on balance, confirming signs of management commitment to quality are more than negating signs, employees and customers will be assured of the organization's commitment to quality. |

Turn to the back of the book to check your answers.

Total Correct _____

DISCUSSION QUESTIONS

1. Why is everyone from the CEO to the production worker or service provider directly responsible for quality?
2. Explain why supervisors are often in the best position to champion training programs on quality offered in and out of the company.
3. What changes do you feel would take place in the work environment of a company that adopts a quality-oriented philosophy?
4. Describe some "confirming signs" that your managers communicate about their commitment to quality, and describe any "negating signs" they communicate.

CASE: PHILOSOPHY

SITUATION

Bill has returned from a two-day seminar at the home office in which the importance of quality was discussed in detail. A company-wide initiative on improving quality is going to be rolled out. All areas of the company will focus on improving quality. The first step is to provide training on quality to all employees and the first training session will cover the fundamental tools of quality control.

Bill was told that all of his employees must have a positive attitude toward the quality initiative in general and toward all training programs specifically. To kick off the initiative, all employees, including supervisors, will attend a twelve contact-hour training program where they will learn how to use the fundamental tools

of quality control in completing their jobs. A quality expert was hired by the company to conduct the training session.

OBJECTIVE

Gain the support of all supervisors and employees for the quality program.

PROBLEM

Attention to quality has not always been consistent at the company. This is especially true in Ricardo's department. Just last week, Bill ordered Ricardo to ship a load of product to one of its largest and oldest customers. The quality of the product was questionable. It did not meet the quality specifications set by the quality control department. Some of Ricardo's employees knew

about the shipment and were confused and even a bit angry that the product was shipped. This type of thing happens periodically in all departments. Some employees have made the statement that “Bill cares more about profits than he does about the customer.” Several employees have also exclaimed to Ricardo about how poor quality will one day cost them their jobs if this sort of thing doesn’t stop.

Bill called a meeting with the supervisors to determine the best way to conduct the training. Since all employees are expected to attend, scheduling will be critical. Bill does not want productivity to go down due to the training.

PLAYERS

Bill and the supervisors: Ricardo, Gerald, and Yolanda.

PROCEDURE

Use a fishbowl arrangement. Have the four players circle their chairs in the middle of the classroom so all other students in the class can see and hear their meeting. Bill and the supervisors will discuss all pertinent factors related to the company’s quality program. The discussion should last approximately ten minutes.

CASE DISCUSSION AND QUESTIONS

A facilitated discussion involving the entire class should be conducted. Discuss the issues brought up by the players and discuss new ones as they arise. Focus on some of the challenges facing the quality initiative in Bill’s area. How will the supervisors gain the acceptance from their employees for such an initiative? How will they overcome their past practices of shipping bad parts?

IMPLEMENTATION EXERCISE

In completing this exercise, assume one of the two following conditions regarding the organization in which you work or an organization of which you are familiar: (1) You are a supervisor or team leader who is currently adopting a total quality system; or (2) You are the training director of a firm that is considering the adoption of a quality system.

Further, assume that you have made a survey and there is a sizable “gap” between what your current product quality, customer service, and accountability levels are and what they should be. Based on what you know of this organization, please list non-acceptable levels below.

Product Quality	Customer Service	Accountability
10	10	10
9	9	9
8	8	8
7	7	7
6	6	6
5	5	5
4	4	4
3	3	3
2	2	2
1	1	1

Your goals over the next six months are as follows:

Product Quality	Customer Service	Accountability
10	10	10
9	9	9
8	8	8
7	7	7
6	6	6
5	5	5
4	4	4
3	3	3
2	2	2
1	1	1

What measures would you initiate to meet your goals? Please list three each for Product Quality, Customer Service, and Accountability.

PERSONAL GROWTH EXERCISE

If your company is involved in a quality initiative, discuss the advantages and disadvantages of the effort.

NOTES

1. W. Edwards Deming, *Quality, Productivity, and Competitive Position*. Cambridge, MA: Center for Advanced Engineering Study, MIT, 1982.
2. Philip B. Crosby, *Quality Is Free*. New York: McGraw-Hill, 1979.
3. Joseph M. Juran, *Juran on Planning for Quality*. New York: The Free Press, 1988.
4. Bruce A. Henderson and Jorge L. Larco, *Lean Transformation: How to Change Your Business Into a Lean Enterprise*. Richmond, VA: The Oaklea Press, 2000, pp. 45–66.
5. National Institute of Standards and Technology, “Frequently Asked Questions about the Malcolm Baldrige National Quality Award,” http://www.nist.gov/public_affairs/factsheet/baldfaq.htm (accessed January 14, 2008).
6. American Society for Quality, <http://www.asq.org>.
7. American Society for Quality, “Continuous Improvement,” <http://www.asq.org/learn-about-quality/continuous-improvement/overview/overview.html> (accessed January 14, 2008); Mary Walton, *The Deming Management Method*. New York: Putnam Publishing Group, 1986, pp. 86–88.