Managing Quality

6

PowerPoint presentation to accompany
Heizer, Render, Munson / Global Edition
Operations Management, Twelfth Edition
Principles of Operations Management, Tenth Edition

PowerPoint slides by Jeff Heyl

Outline

- **Global Company Profile:** Arnold Palmer Hospital
- Quality and Strategy
- Defining Quality
- Total Quality Management
- Tools of TQM
- The Role of Inspection
- TQM in Services

Managing Quality Provides a Competitive Advantage

Arnold Palmer Hospital

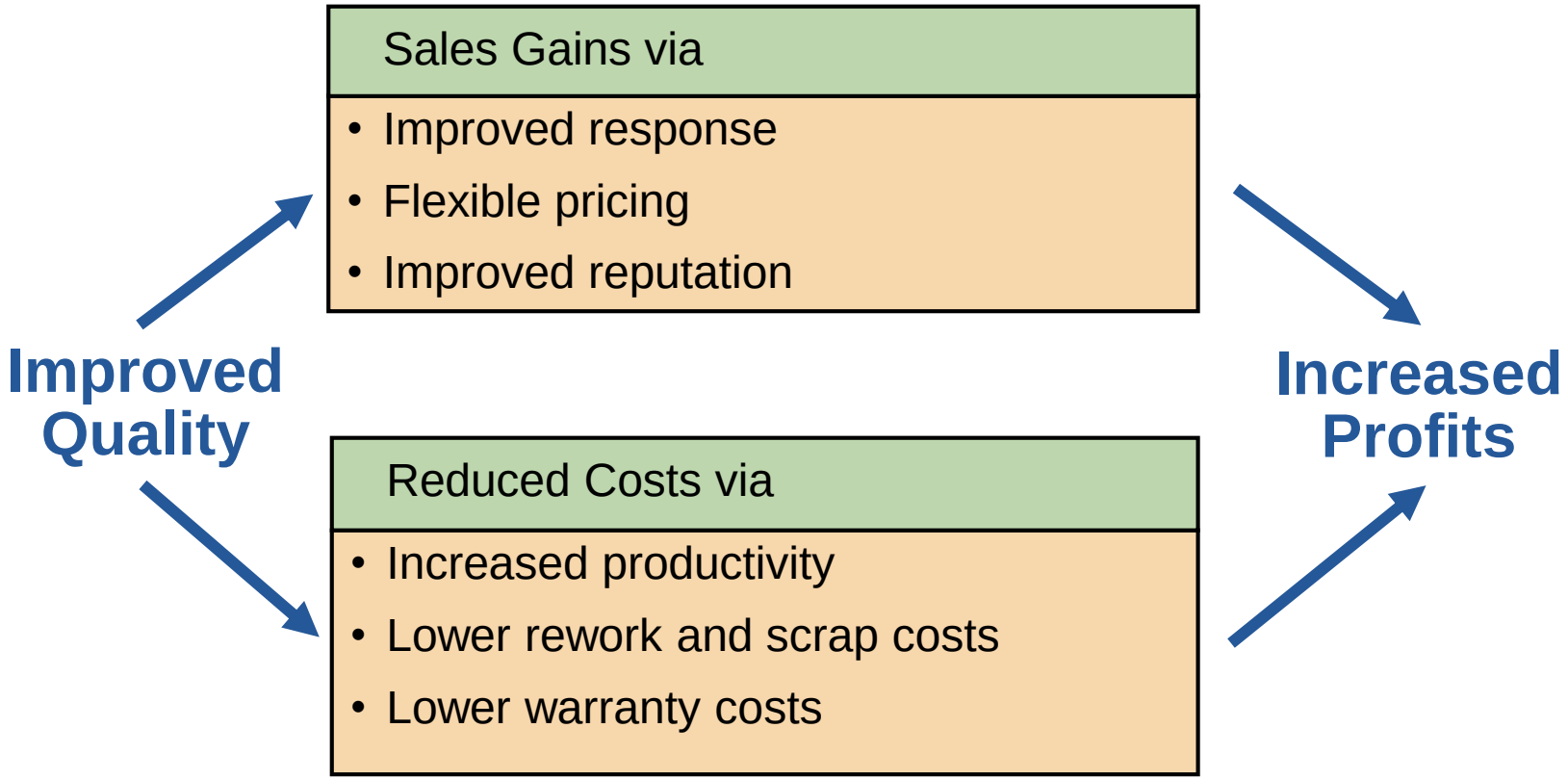
- Delivers over 12,000 babies annually
- Virtually every type of quality tool is employed
  - Continuous improvement
  - Employee empowerment
  - Benchmarking
  - Just-in-time
  - Quality tools

Quality and Strategy

- Managing quality supports *differentiation*, *low cost*, and *response* strategies
- Quality helps firms increase sales and reduce costs
- *Building* a quality organization is a demanding task

Two Ways Quality Improves Profitability

Figure 6.1



The Flow of Activities

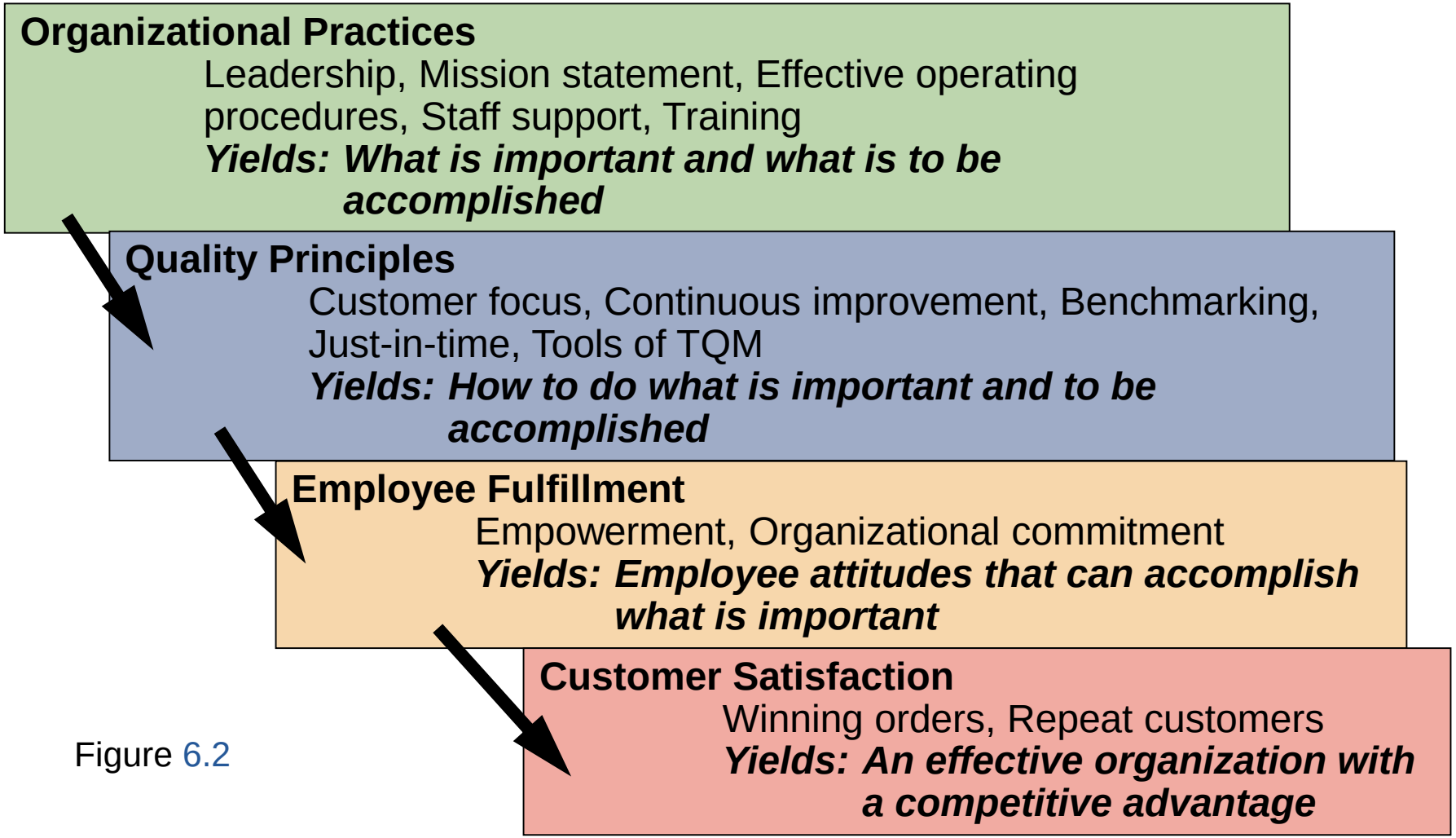


Figure 6.2

Defining Quality

An operations manager's objective is to build a total quality management system that identifies and satisfies customer needs

Defining Quality

The totality of features and characteristics of a product or service that bears on its ability to satisfy stated or implied needs

American Society for Quality

Dimensions of Product Quality

HBR
Performance refers to a product's primary operating characteristics
Features refers to secondary aspect of performance and those characteristics that supplement the basic functioning
Reliability reflects probability of a product malfunctioning or failing within a specified time period (mean time to first failure, mean time between failures)
Conformance refers to the degree to which a product's design and operating characteristics meet established standards or specifications (defect rates, service calls)
Durability refers to the amount of use one gets from a product before it deteriorates or breaks down (a measure of product life)
Serviceability includes speed, courtesy, competence, service standard, and the ease of repair and installation (mean time to repair, timeliness, complaint-handling procedures)
Aesthetics involves how a product looks, feels, sounds, tastes, or smells (a subjective dimension based on individual preference)
Perceived quality is inferred about quality rather than reality itself from various tangible and intangible aspects of a product i.e. reputation, images, advertising and brand names

Source: David A. Garvin (1987). Competing on the Eight Dimensions of Quality. *Harvard Business Review.* The November 1987 Issue.

Determinants of Service Quality

Table 6.5
Reliability involves consistency of performance and dependability
Responsiveness concerns the willingness or readiness of employees to provide service
Competence means possession of the required skills and knowledge to perform the service
Access involves approachability and ease of contact
Courtesy involves politeness, respect, consideration, and friendliness
Communication means keeping customers informed and listening to them
Credibility involves trustworthiness, believability, and honesty
Security is the freedom from danger, risk, or doubt
Understanding/knowing the customer involves making the effort to understand the customer's needs
Tangibles include the physical evidence of the service

Implications of Quality

1. Company reputation
   - Perception of new products
   - Employment practices
   - Supplier relations
2. Product liability
   - Reduce risk
3. Global implications
   - Improved ability to compete

Malcolm Baldrige National Quality Award

- Established in 1988 by the U.S. government
- Designed to promote TQM practices
- Recent winners include

  MidwayUSA, Charter School of San Diego, Mid-America Transplant Services, Hill Country Memorial, PricewaterhouseCoopers Public Sector Practice, Elevations Credit Union, Lockheed Martin Missiles and Fire Control, MESA Products Inc.

Baldrige Criteria

Applicants are evaluated on:

CATEGORIES	POINTS
Leadership	120
Strategic Planning	85
Customer Focus	85
Measurement, Analysis, and Knowledge Management	90
Workforce Focus	85
Operations Focus	85
Results	450

ISO 9000 International Quality Standards

- International recognition
- Encourages quality management procedures, detailed documentation, work instructions, and recordkeeping
- 2015 revision gives greater emphasis to *risk-based thinking*
- Over one million certifications in 206 countries
- Critical for global business

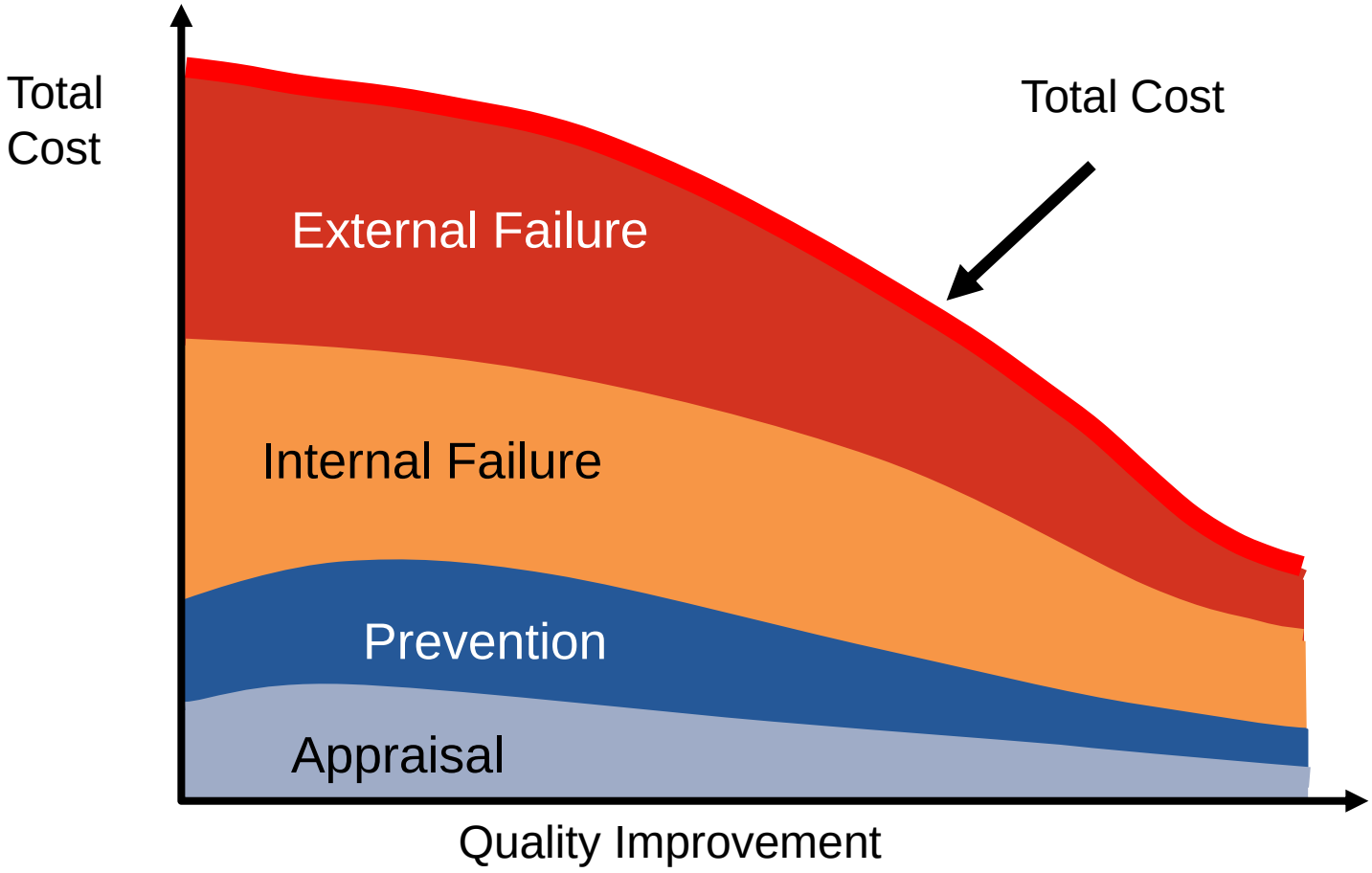
ISO 9000 International Quality Standards (2015 revision)

- Quality Management principles
  1) Customer focus
  2) Leadership
  3) Improvement
  4) Engagement of people
  5) Process approach
  6) Evidence-base decision making
  7) Relationship management

Costs of Quality

- *Prevention costs* - reducing the potential for defects
- *Appraisal costs* - evaluating products, parts, and services
- *Internal failure costs* - producing defective parts or service before delivery
- *External failure costs* - defects discovered after delivery

Costs of Quality



Leaders in Quality

TABLE 6.1	Leaders in the Field of Quality Management
LEADER	**PHILOSOPHY/CONTRIBUTION**
W. Edwards Deming	Deming insisted management accept responsibility for building good systems. The employee cannot produce products that on average exceed the quality of what the process is capable of producing. His 14 points for implementing quality improvement are presented in this chapter.
Joseph M. Juran	A pioneer in teaching the Japanese how to improve quality, Juran believed strongly in top-management commitment, support, and involvement in the quality effort. He was also a believer in teams that continually seek to raise quality standards. Juran varies from Deming somewhat in focusing on the customer and defining quality as fitness for use, not necessarily the written specifications.

Leaders in Quality

TABLE 6.1 Leaders in the Field of Quality Management

LEADER	PHILOSOPHY/CONTRIBUTION
Armand Feigenbaum	His 1961 book Total Quality Control laid out 40 steps to quality improvement processes. He viewed quality not as a set of tools but as a total field that integrated the processes of a company. His work in how people learn from each other's successes led to the field of cross-functional teamwork.
Philip B. Crosby	*Quality Is Free* was Crosby's attention-getting book published in 1979. Crosby believed that in the traditional trade-off between the cost of improving quality and the cost of poor quality, the cost of poor quality is understated. The cost of poor quality should include all of the things that are involved in not doing the job right the first time. Crosby coined the term *zero defects* and stated, "There is absolutely no reason for having errors or defects in any product or service."

Ethics and Quality Management

- Operations managers must deliver healthy, safe, quality products and services
- Poor quality risks injuries, lawsuits, recalls, and regulation
- Ethical conduct must dictate response to problems
- All stakeholders must be considered

Total Quality Management

- Encompasses entire organization from supplier to customer
- Stresses a commitment by management to have a continuing companywide drive toward excellence in all aspects of products and services that are important to the customer

Deming's Fourteen Points

TABLE 6.2	Deming's 14 Points for Implementing Quality Improvement
1.	Create consistency of purpose
2.	Lead to promote change
3.	Build quality into the product; stop depending on inspections to catch problems
4.	Build long-term relationships based on performance instead of awarding business on price
5.	Continuously improve product, quality, and service
6.	Start training
7.	Emphasize leadership

Deming's Fourteen Points

TABLE 6.2	Deming's 14 Points for Implementing Quality Improvement
8.	Drive out fear
9.	Break down barriers between departments
10.	Stop haranguing workers
11.	Support, help, and improve
12.	Remove barriers to pride in work
13.	Institute a vigorous program of education and self-improvement
14.	Put everyone in the company to work on the transformation

Concepts of TQM

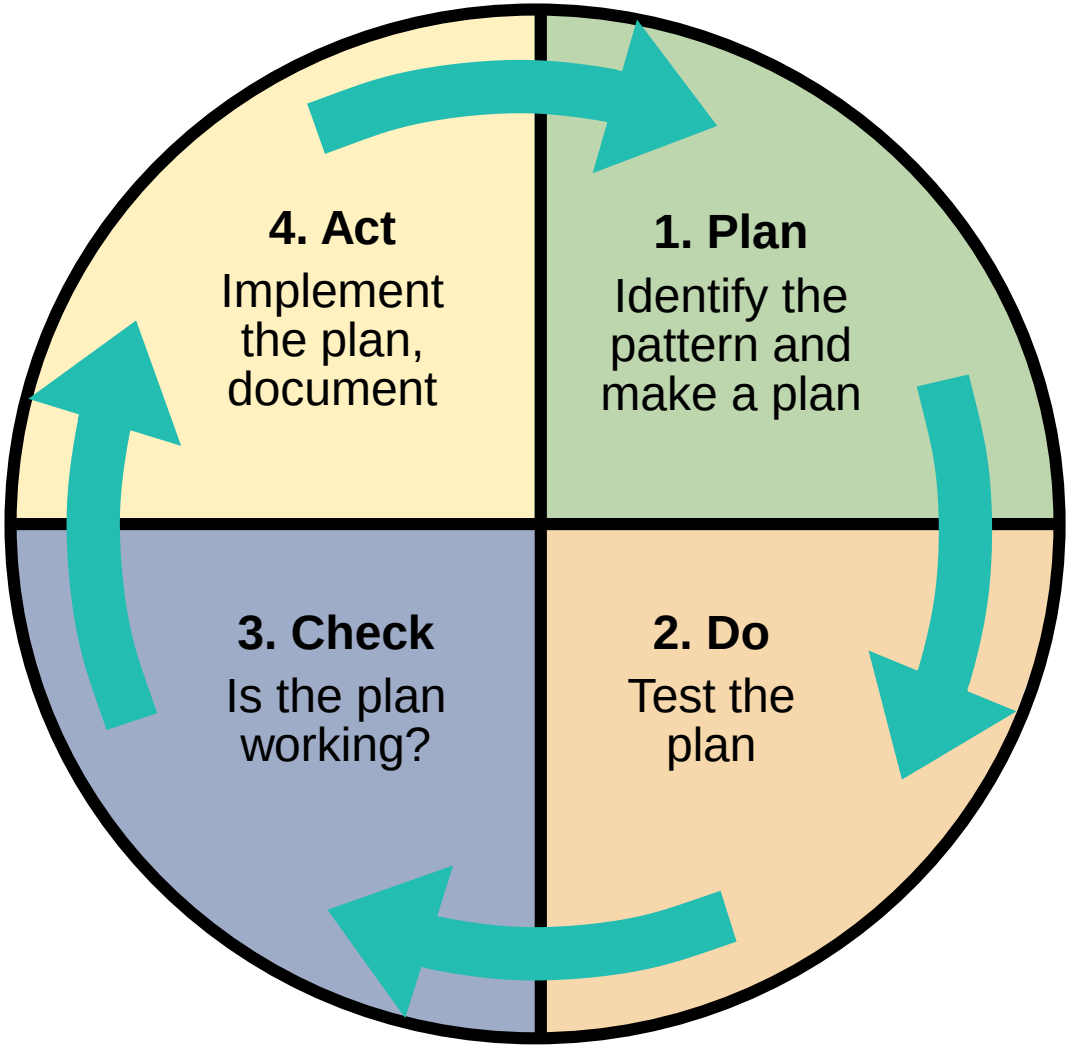
1) Continuous improvement
2) Six Sigma
3) Employee empowerment
4) Benchmarking
5) Just-in-time (JIT)
6) TQM tools

Continuous Improvement

- Never-ending process of continuous improvement
- Covers people, equipment, suppliers, materials, procedures
- Every operation can be improved

Shewhart's PDCA Model

Figure 6.3



Continuous Improvement

- *Kaizen* describes the ongoing process of unending improvement
- *TQM* and *zero defects* also used to describe continuous improvement

Six Sigma

- Two meanings
  - *Statistical* definition of a process that is 99.9997% capable, 3.4 defects per million opportunities (DPMO)
  - A *program* designed to reduce defects, lower costs, save time, and improve customer satisfaction
- A comprehensive system for achieving and sustaining business success

Six Sigma

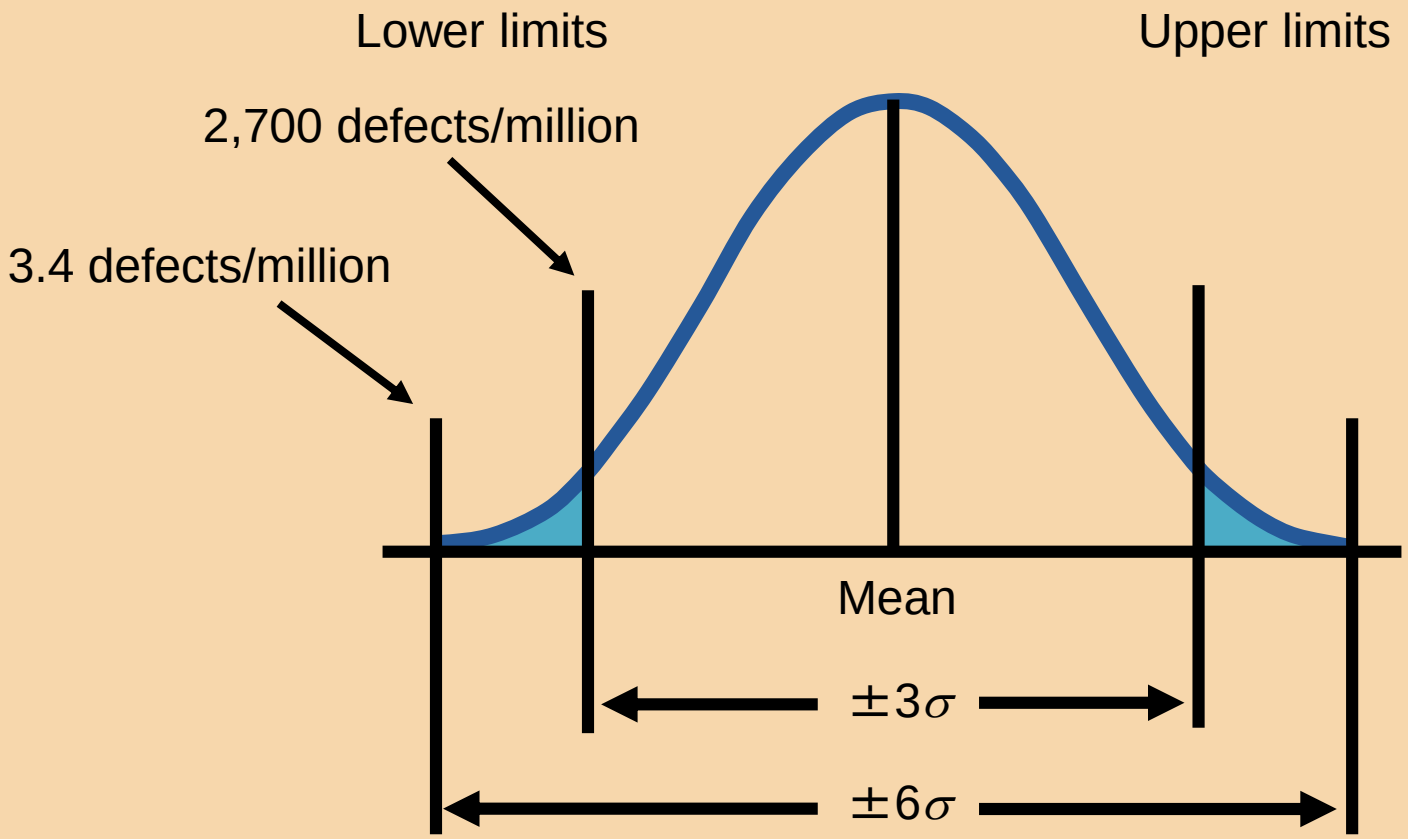


Figure 6.4

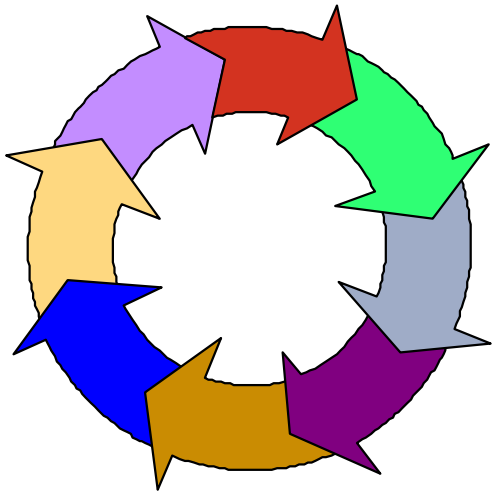
Six Sigma Program

- Originally developed by Motorola, adopted and enhanced by Honeywell and GE
- Highly structured approach to process improvement
  - A strategy
  - A discipline – DMAIC
  - A set of 7 tools

Six Sigma

1. ***Defines*** the project's purpose, scope, and outputs, then identifies the required process information keeping in mind the customer's definition of quality
2. ***Measures*** the process and collects data
3. ***Analyzes*** the data ensuring repeatability and reproducibility
4. ***Improves*** by modifying or redesigning existing processes and procedures
5. ***Controls*** the new process to make sure performance levels are maintained

DMAIC Approach



Implementing Six Sigma

- Emphasize defects per million opportunities as a standard metric
- Provide extensive training
- Focus on top management leadership (Champion)
- Create qualified process improvement experts (Black Belts, Green Belts, etc.)
- Set stretch objectives

Implementing Six Sigma

- Emphasize defects per million opportunities as a standard metric
- Provide extensive training
- Focus on top management leadership (Champion)
- Create qualified process improvement e
- S

This cannot be accomplished without a major commitment from top level management

Employee Empowerment

- Getting employees involved in product and process improvements
  - 85% of quality problems are due to materials and process
- Techniques
  1) Build communication networks that include employees
  2) Develop open, supportive supervisors
  3) Move responsibility to employees
  4) Build a high-morale organization
  5) Create formal team structures

Quality Circles

- Group of employees who meet regularly to solve problems
- Trained in planning, problem solving, and statistical methods
- Often led by a *facilitator*
- Very effective when done properly

Benchmarking

Selecting best practices to use as a standard for performance

1. Determine what to benchmark
2. Form a benchmark team
3. Identify benchmarking partners
4. Collect and analyze benchmarking information
5. Take action to match or exceed the benchmark

Best Practices for Resolving Customer Complaints

Table 6.3

BEST PRACTICE	JUSTIFICATION
Make it easy for clients to complain	It is free market research
Respond quickly to complaints	It adds customers and loyalty
Resolve complaints on first contact	It reduces cost
Use computers to manage complaints	Discover trends, share them, and align your services
Recruit the best for customer service jobs	It should be part of formal training and career advancement

Internal Benchmarking

- When the organization is large enough
- Data more accessible
- Can and should be established in a variety of areas

Just-in-Time (JIT)

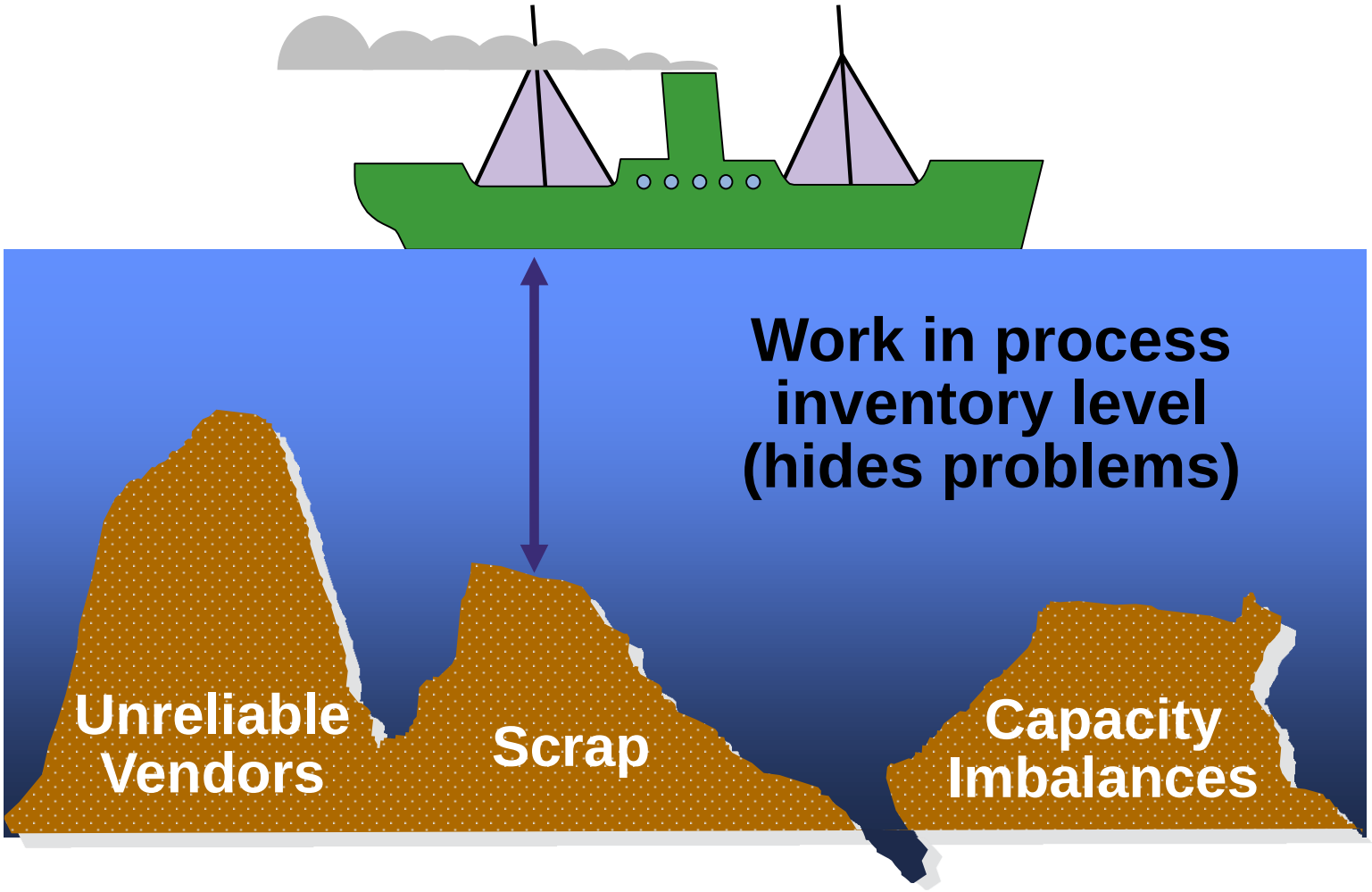
- 'Pull' system of production scheduling including supply management
  - Production only when signaled
- Allows reduced inventory levels
  - Inventory costs money and hides process and material problems
- Encourages improved process and product quality

Just-in-Time (JIT)

Relationship to quality:

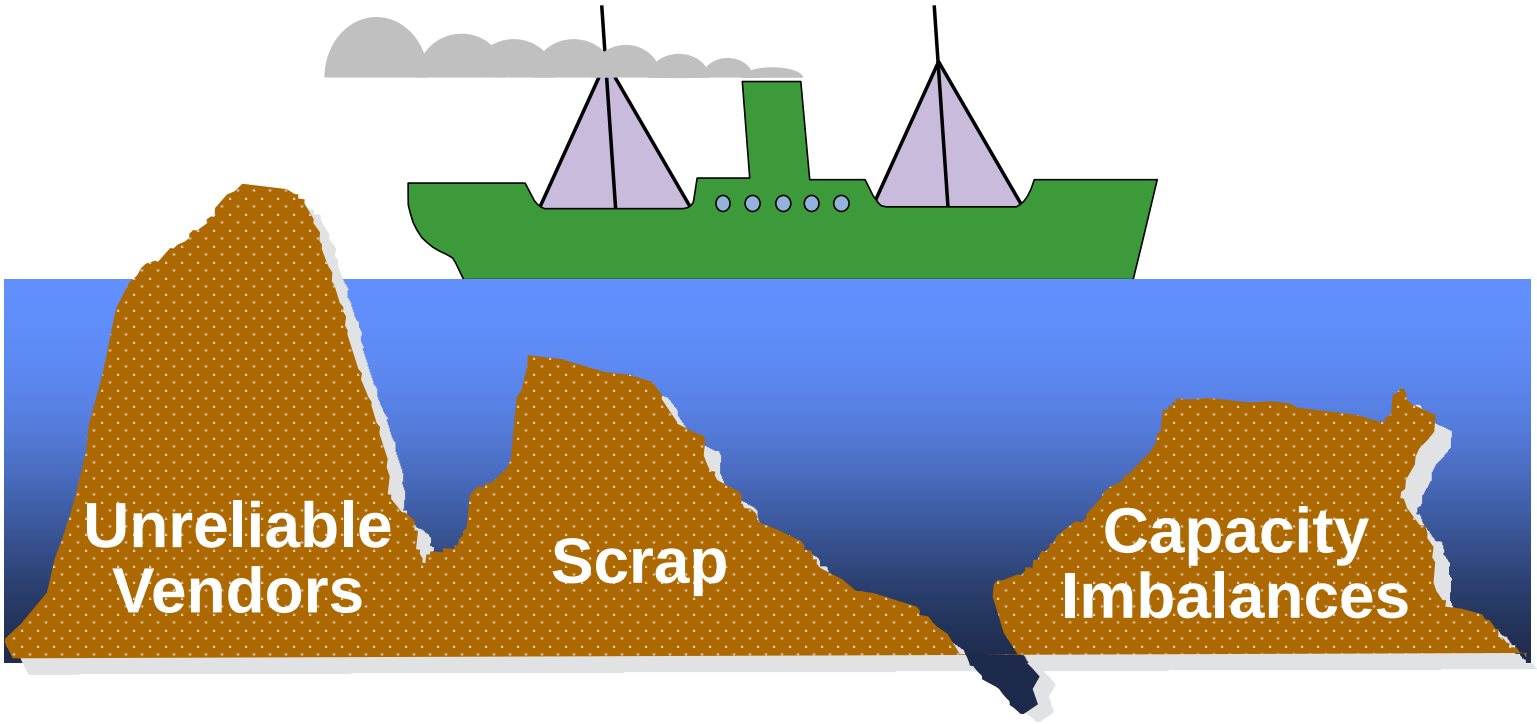
- JIT cuts the cost of quality
- JIT improves quality
- Better quality means less inventory and better, easier-to-employ JIT system

Just-In-Time (JIT) Example



Just-In-Time (JIT) Example

Reducing inventory reveals problems so they can be solved



TQM Tools

- Tools for Generating Ideas
  - Check Sheet
  - Scatter Diagram
  - Cause-and-Effect Diagram
- Tools to Organize the Data
  - Pareto Chart
  - Flowchart (Process Diagram)

TQM Tools

- Tools for Identifying Problems
  - Histogram
  - Statistical Process Control Chart

Seven Tools of TQM

(a) *Check Sheet*: An organized method of recording data

	Hour							
Defect	1	2	3	4	5	6	7	8
A	///	/		/	/	/	///	/
B	//	/	/	/			//	///
C	/	//					//	////

Figure 6.6

Seven Tools of TQM

(b) *Scatter Diagram*: A graph of the value of one variable vs. another variable

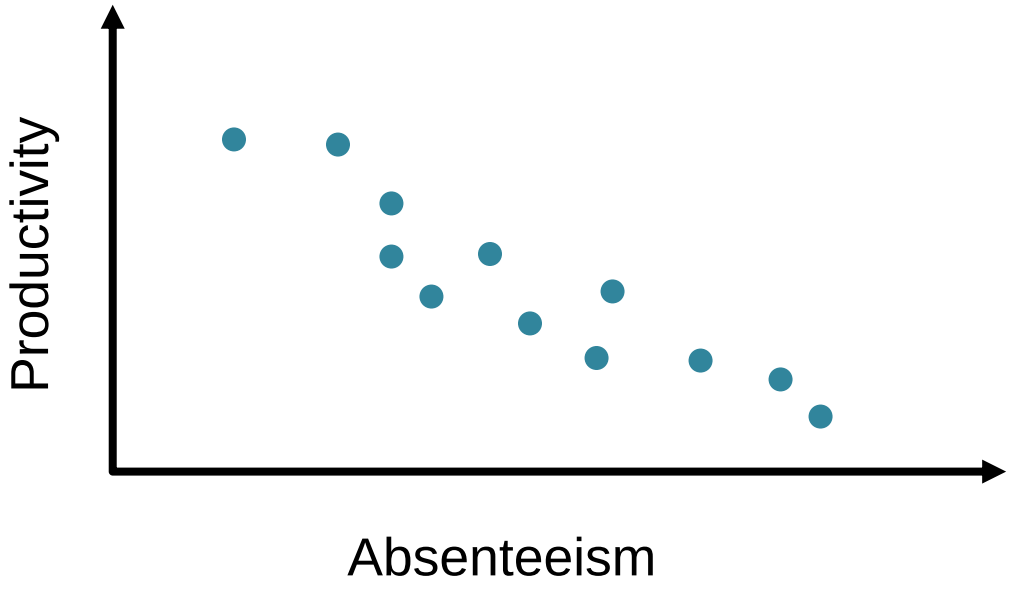


Figure 6.6

Seven Tools of TQM

(c) *Cause-and-Effect Diagram*: A tool that identifies process elements (causes) that may effect an outcome

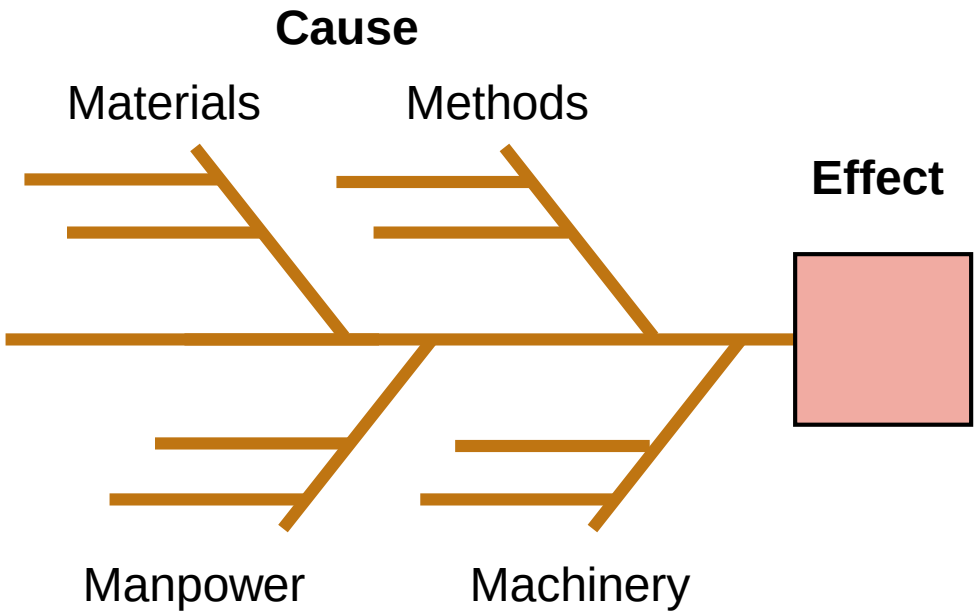


Figure 6.6

Seven Tools of TQM

(d) *Pareto Chart*: A graph to identify and plot problems or defects in descending order of frequency

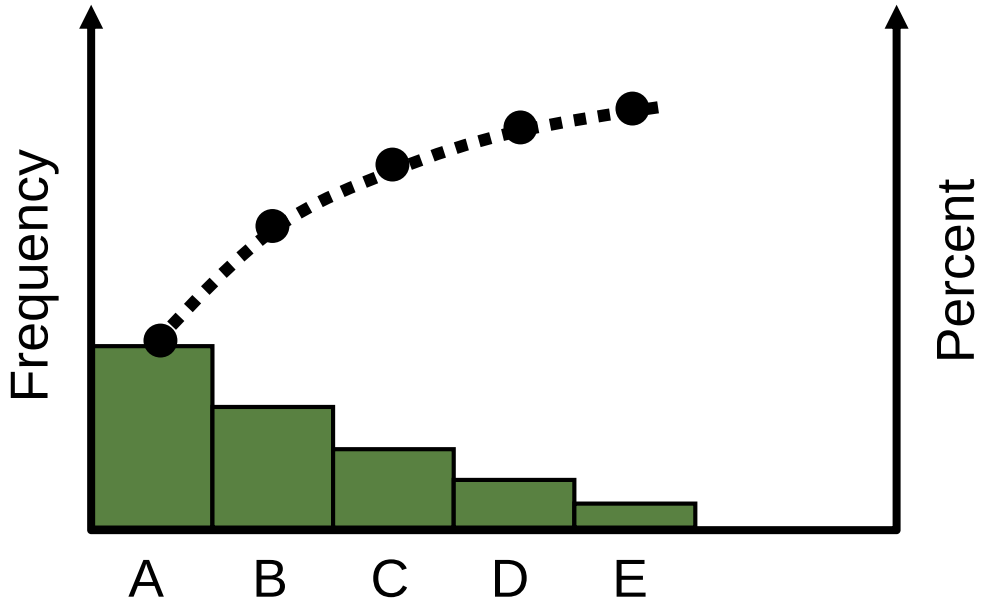


Figure 6.6

Seven Tools of TQM

(e) *Flowchart (Process Diagram)*: A chart that describes the steps in a process

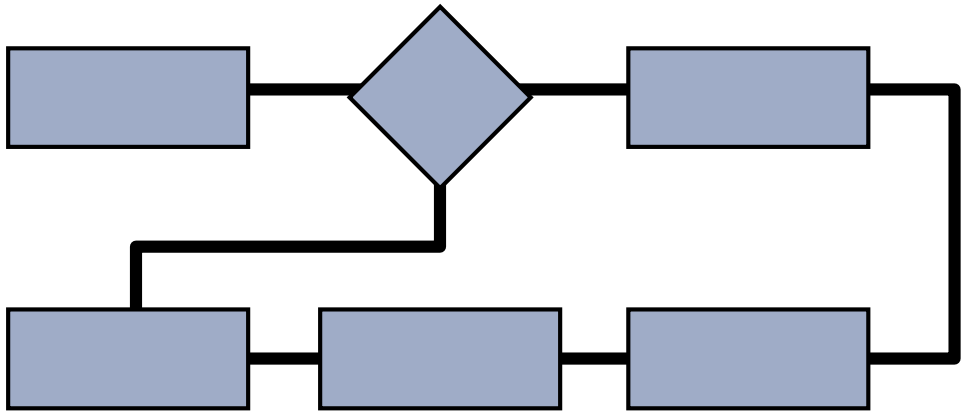


Figure 6.6

Seven Tools of TQM

(f) *Histogram*: A distribution showing the frequency of occurrences of a variable

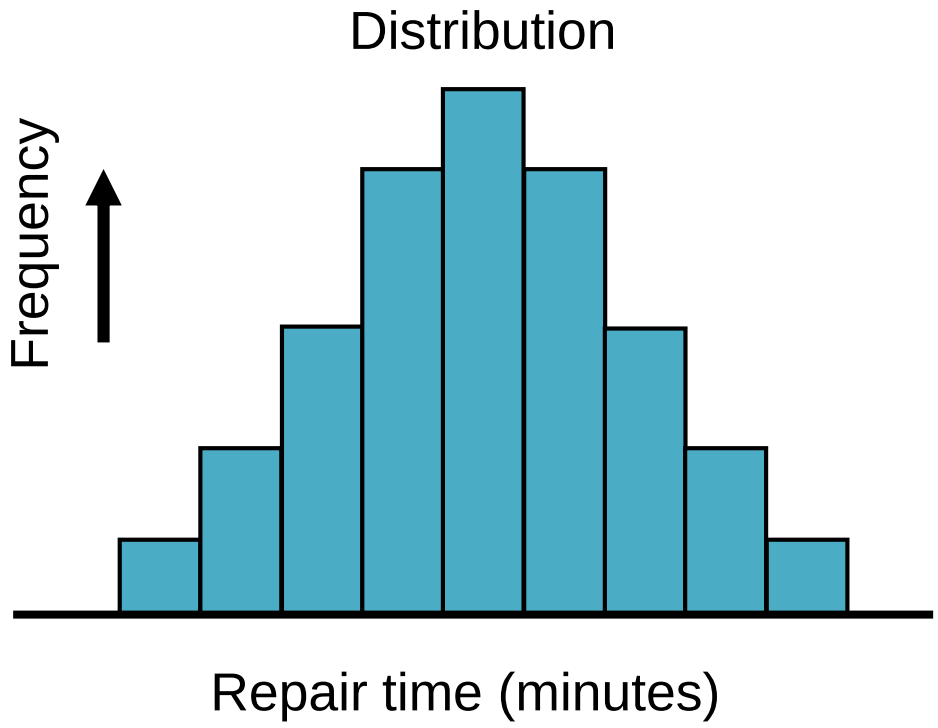


Figure 6.6

Seven Tools of TQM

(g) *Statistical Process Control C*hart: A chart with time on the horizontal axis to plot values of a statistic

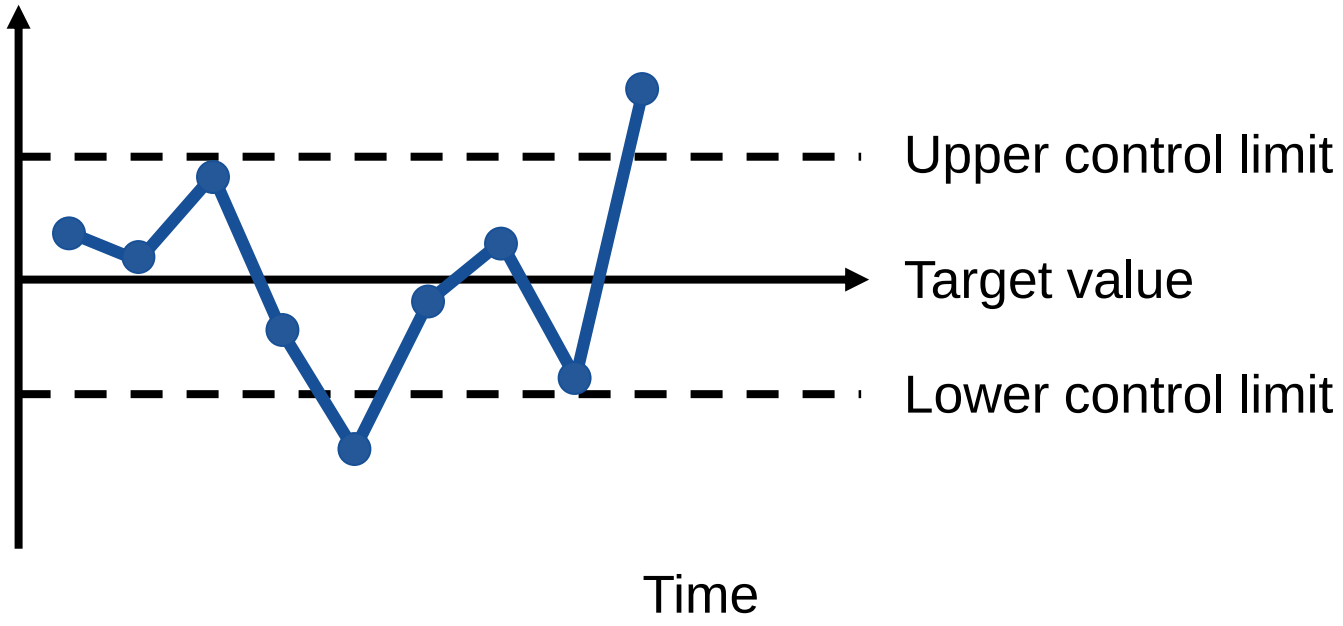


Figure 6.6

Inspection

- Involves examining items to see if an item is good or defective
- Detect a defective product
  - Does not correct deficiencies in process or product
  - It is expensive
- Issues
  - When to inspect
  - Where in process to inspect

When and Where to Inspect

1. At the supplier's plant while the supplier is producing
2. At your facility upon receipt of goods from your supplier
3. Before costly or irreversible processes
4. During the step-by-step production process
5. When production or service is complete
6. Before delivery to your customer
7. At the point of customer contact

Inspection

- Many problems
  - Worker fatigue
  - Measurement error
  - Process variability
- Cannot inspect quality into a product
- Robust design, empowered employees, and sound processes are better solutions

Source Inspection

- Also known as source control
- The next step in the process is your customer
- Ensure perfect product to your customer

Source Inspection

- **Poka-yoke** is the concept of foolproof devices or techniques designed to pass only acceptable products
- **Checklists** ensure consistency and completeness

Service Industry Inspection

TABLE 6.4 Examples of Inspection in Services

ORGANIZATION	WHAT IS INSPECTED	STANDARD
Alaska Airlines	Last bag on carousel	Less than 20 minutes after arrival at the gate
	Airplane door opened	Less than 2 minutes after arrival at the gate
Jones Law Office	Receptionist performance	Phone answered by the second ring
	Billing	Accurate, timely, and correct format
	Attorney	Promptness in returning calls
Hard Rock Hotel	Reception desk	Use customer's name
	Doorman	Greet guest in less than 30 seconds
	Room	All lights working, spotless bathroom
	Minibar	Restocked and charges accurately posted to bill

Service Industry Inspection

TABLE 6.4	Examples of Inspection in Services	
ORGANIZATION	**WHAT IS INSPECTED**	**STANDARD**
Arnold Palmer Hospital	Billing	Accurate, timely, and correct format
	Pharmacy	Prescription accuracy, inventory accuracy
	Lab	Audit for lab-test accuracy
	Nurses	Charts immediately updated
	Admissions	Data entered correctly and completely
Olive Garden Restaurant	Busboy	Serves water and bread within 1 minute
	Busboy	Clears all entrée items and crumbs prior to dessert
	Waiter	Knows and suggest specials, desserts

Service Industry Inspection

TABLE 6.4	Examples of Inspection in Services	
ORGANIZATION	**WHAT IS INSPECTED**	**STANDARD**
Nordstrom Department Store	Display areas	Attractive, well-organized, stocked, good lighting
	Stockrooms	Rotation of goods, organized, clean
	Salesclerks	Neat, courteous, very knowledgeable

TQM In Services

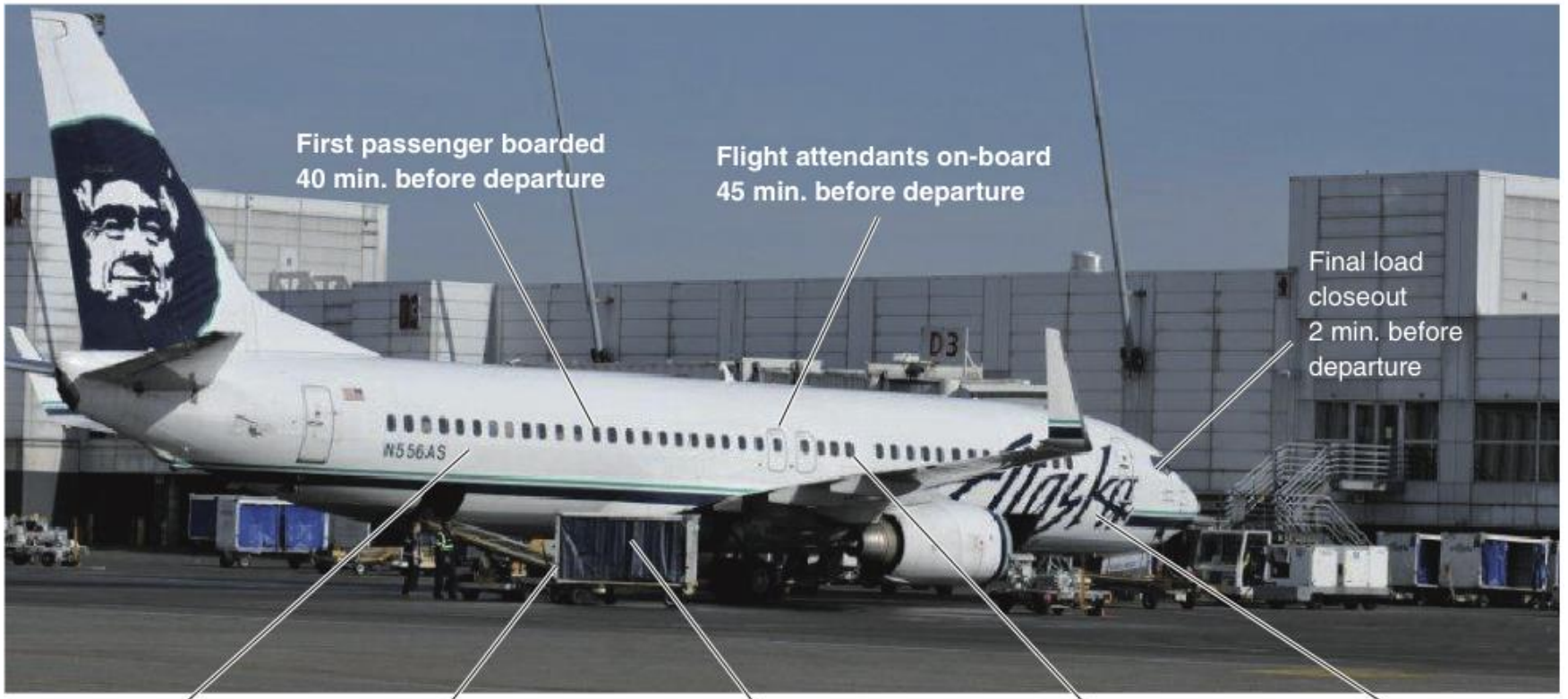
- Service quality is more difficult to measure than the quality of goods
- Service quality perceptions depend on
  1) *Intangible differences between products*
  2) *Intangible expectations customers have of those products*

Service Quality

The operations manager must recognize:

- The tangible component of services is important
- The service process is important
- The service is judged against the customer's expectations
- Exceptions will occur

Service Specifications



Service Recovery Strategy

- Managers should have a plan for when services fail
- Marriott's **LEARN** routine
  - Listen
  - Empathize
  - Apologize
  - React
  - Notify