What does the term quality mean?

Quality is the ability of a product or service to consistently meet or exceed customer expectations.
### Evolution of Quality Management

- 1924 - Statistical process control charts
- 1930 - Tables for acceptance sampling
- 1940’s - Statistical sampling techniques
- 1950’s - Quality assurance/TQC
- 1960’s - Zero defects
- 1970’s - Quality assurance in services

### Quality Assurance vs. Strategic Approach

- **Quality Assurance**
  - Emphasis on finding and correcting defects before reaching market
- **Strategic Approach**
  - Proactive, focusing on preventing mistakes from occurring
  - Greater emphasis on customer satisfaction

### The Quality Gurus

- Walter Shewhart
  - “Father of statistical quality control”
- W. Edwards Deming
- Joseph M. Juran
- Armand Feignbaum
- Philip B. Crosby
- Kaoru Ishikawa
- Genichi Taguchi
Key Contributors to Quality Management

<table>
<thead>
<tr>
<th>Contributor</th>
<th>Known for</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deming</td>
<td>14 points; special &amp; common causes of variation</td>
</tr>
<tr>
<td>Juran</td>
<td>Quality is fitness for use; quality trilogy</td>
</tr>
<tr>
<td>Feigenbaum</td>
<td>Quality is a total field</td>
</tr>
<tr>
<td>Crosby</td>
<td>Quality is free; zero defects</td>
</tr>
<tr>
<td>Ishikawa</td>
<td>Cause-and-effect diagrams; quality circles</td>
</tr>
<tr>
<td>Taguchi</td>
<td>Taguchi loss function</td>
</tr>
</tbody>
</table>

Table 9.2

Dimensions of Quality

- **Performance** - main characteristics of the product/service
- **Aesthetics** - appearance, feel, smell, taste
- **Special Features** - extra characteristics
- **Conformance** - how well product/service conforms to customer’s expectations
- **Reliability** - consistency of performance

Dimensions of Quality (Cont’d)

- **Durability** - useful life of the product/service
- **Perceived Quality** - indirect evaluation of quality (e.g. reputation)
- **Serviceability** - service after sale
### Examples of Quality Dimensions

<table>
<thead>
<tr>
<th>Dimension</th>
<th>(Product) Automobile</th>
<th>(Service) Auto Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Performance</td>
<td>Everything works, fit &amp; finish</td>
<td>All work done, at agreed price</td>
</tr>
<tr>
<td></td>
<td>Ride, handling, grade of materials used</td>
<td>Friendliness, courtesy, Competency, quickness</td>
</tr>
<tr>
<td>2. Aesthetics</td>
<td>Interior design, soft touch</td>
<td>Clean work/waiting area</td>
</tr>
<tr>
<td>3. Special features</td>
<td>Gauge/control placement, Cellular phone, CD player</td>
<td>Location, call when ready, Computer diagnostics</td>
</tr>
</tbody>
</table>

### Examples of Quality Dimensions (Cont’d)

<table>
<thead>
<tr>
<th>Dimension</th>
<th>(Product) Automobile</th>
<th>(Service) Auto Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Reliability</td>
<td>Infrequency of breakdowns</td>
<td>Work done correctly, ready when promised</td>
</tr>
<tr>
<td>6. Durability</td>
<td>Useful life in miles, resistance to rust &amp; corrosion</td>
<td>Work holds up over time</td>
</tr>
<tr>
<td>7. Perceived quality</td>
<td>Top-rated car</td>
<td>Award-winning service department</td>
</tr>
<tr>
<td>8. Serviceability</td>
<td>Handling of complaints and/or requests for information</td>
<td></td>
</tr>
</tbody>
</table>

### Service Quality

- Tangibles
- Convenience
- Reliability
- Responsiveness
- Time
- Assurance
- Courtesy
Examples of Service Quality

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Tangibles</td>
<td>Were the facilities clean, personnel neat?</td>
</tr>
<tr>
<td>2. Convenience</td>
<td>Was the service center conveniently located?</td>
</tr>
<tr>
<td>3. Reliability</td>
<td>Was the problem fixed?</td>
</tr>
<tr>
<td>4. Responsiveness</td>
<td>Were customer service personnel willing and able to answer questions?</td>
</tr>
<tr>
<td>5. Time</td>
<td>How long did the customer wait?</td>
</tr>
<tr>
<td>6. Assurance</td>
<td>Did the customer service personnel seem knowledgeable about the repair?</td>
</tr>
<tr>
<td>7. Courtesy</td>
<td>Were customer service personnel and the cashier friendly and courteous?</td>
</tr>
</tbody>
</table>

Determinants of Quality

- Design
- Ease of use
- Conforms to design
- Service

Determinants of Quality (cont’d)

- Quality of design
- Intension of designers to include or exclude features in a product or service
- Quality of conformance
  - The degree to which goods or services conform to the intent of the designers
The Consequences of Poor Quality

- Loss of business
- Liability
- Productivity
- Costs

Responsibility for Quality

- Top management
- Design
- Procurement
- Production/operations
- Quality assurance
- Packaging and shipping
- Marketing and sales
- Customer service

Costs of Quality

- Failure Costs - costs incurred by defective parts/products or faulty services.
- Internal Failure Costs
  - Costs incurred to fix problems that are detected before the product/service is delivered to the customer.
- External Failure Costs
  - All costs incurred to fix problems that are detected after the product/service is delivered to the customer.
Costs of Quality (continued)

- Appraisal Costs
  - Costs of activities designed to ensure quality or uncover defects
- Prevention Costs
  - All TQ training, TQ planning, customer assessment, process control, and quality improvement costs to prevent defects from occurring

Ethics and Quality

- Substandard work
  - Defective products
  - Substandard service
  - Poor designs
  - Shoddy workmanship
  - Substandard parts and materials

Having knowledge of this and failing to correct and report it in a timely manner is unethical.

Quality Awards

Baldrige Award
Deming Prize
Malcolm Baldrige National Quality Award

- 1.0 Leadership (125 points)
- 2.0 Strategic Planning (85 points)
- 3.0 Customer and Market Focus (85 points)
- 4.0 Information and Analysis (85 points)
- 5.0 Human Resource Focus (85 points)
- 6.0 Process Management (85 points)
- 7.0 Business Results (450 points)

Benefits of Baldrige Competition

- Financial success
- Winners share their knowledge
- The process motivates employees
- The process provides a well-designed quality system
- The process requires obtaining data
- The process provides feedback

European Quality Award

- Prizes intended to identify role models
  - Leadership
  - Customer focus
  - Corporate social responsibility
  - People development and involvement
  - Results orientation
The Deming Prize

- Honoring W. Edwards Deming
- Japan’s highly coveted award
- Main focus on statistical quality control

Quality Certification

- ISO 9000
  - Set of international standards on quality management and quality assurance, critical to international business
- ISO 14000
  - A set of international standards for assessing a company’s environmental performance

ISO 9000 Standards

Requirements
- System requirements
- Management
- Resource
- Realization
- Remedial
ISO 9000 Quality Management Principles

- A systems approach to management
- Continual improvement
- Factual approach to decision making
- Mutually beneficial supplier relationships
- Customer focus
- Leadership
- People involvement
- Process approach

ISO 14000

- ISO 14000 - A set of international standards for assessing a company’s environmental performance
- Standards in three major areas
  - Management systems
  - Operations
  - Environmental systems

ISO 14000

- Management systems
  - Systems development and integration of environmental responsibilities into business planning
- Operations
  - Consumption of natural resources and energy
- Environmental systems
  - Measuring, assessing and managing emissions, effluents, and other waste
Total Quality Management

A philosophy that involves everyone in an organization in a continual effort to improve quality and achieve customer satisfaction.

The TQM Approach

1. Find out what the customer wants
2. Design a product or service that meets or exceeds customer wants
3. Design processes that facilitate doing the job right the first time
4. Keep track of results
5. Extend these concepts to suppliers

Elements of TQM

- Continual improvement
- Competitive benchmarking
- Employee empowerment
- Team approach
- Decisions based on facts
- Knowledge of tools
- Supplier quality
- Champion
- Quality at the source
- Suppliers
Continuous Improvement

• Philosophy that seeks to make never-ending improvements to the process of converting inputs into outputs.
• Kaizen: Japanese word for continuous improvement.

Quality at the Source

The philosophy of making each worker responsible for the quality of his or her work.

Six Sigma

• Statistically
  • Having no more than 3.4 defects per million
• Conceptually
  • Program designed to reduce defects
  • Requires the use of certain tools and techniques
Six Sigma Programs

- Six Sigma programs
- Improve quality
- Save time
- Cut costs
- Employed in
  - Design
  - Production
  - Service
  - Inventory management
  - Delivery

Six Sigma Management

- Providing strong leadership
- Defining performance merits
- Selecting projects likely to succeed
- Selecting and training appropriate people

Six Sigma Technical

- Improving process performance
- Reducing variation
- Utilizing statistical models
- Designing a structured improvement strategy
**Six Sigma Team**

- Top management
- Program champions
- Master “black belts”
- “Black belts”
- “Green belts”

**Six Sigma Process**

- Define
- Measure
- Analyze
- Improve
- Control

DMAIC

**Obstacles to Implementing TQM**

- Lack of:
  - Company-wide definition of quality
  - Strategic plan for change
  - Customer focus
  - Real employee empowerment
  - Strong motivation
  - Time to devote to quality initiatives
  - Leadership
Obstacles to Implementing TQM

- Poor inter-organizational communication
- View of quality as a “quick fix”
- Emphasis on short-term financial results
- Internal political and “turf” wars

Criticisms of TQM

- Blind pursuit of TQM programs
- Programs may not be linked to strategies
- Quality-related decisions may not be tied to market performance
- Failure to carefully plan a program

Basic Steps in Problem Solving

1. Define the problem and establish an improvement goal
2. Collect data
3. Analyze the problem
4. Generate potential solutions
5. Choose a solution
6. Implement the solution
7. Monitor the solution to see if it accomplishes the goal
The PDSA Cycle

Plan

Act

Do

Study

Process Improvement

- Process Improvement: A systematic approach to improving a process
- Process mapping
- Analyze the process
- Redesign the process

The Process Improvement Cycle

Select a process

Document

Evaluate

Implement the improved process

Study/document

Seek ways to improve it

Design an improved process
Process Improvement and Tools

- Process improvement - a systematic approach to improving a process
  - Process mapping
  - Analyze the process
  - Redesign the process
- Tools
  - There are a number of tools that can be used for problem solving and process improvement
  - Tools aid in data collection and interpretation, and provide the basis for decision making

Basic Quality Tools

- Flowcharts
- Check sheets
- Histograms
- Pareto Charts
- Scatter diagrams
- Control charts
- Cause-and-effect diagrams
- Run charts

Check Sheet

<table>
<thead>
<tr>
<th>Billing Errors</th>
<th>Monday</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wrong Account</td>
<td>[H4][H1]</td>
</tr>
<tr>
<td>Wrong Amount</td>
<td>[H4]</td>
</tr>
<tr>
<td>A/R Errors</td>
<td></td>
</tr>
<tr>
<td>Wrong Account</td>
<td>[H1]</td>
</tr>
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Pareto Analysis

80% of the problems may be attributed to 20% of the causes.

Control Chart

Figure 9.11

Cause-and-Effect Diagram

Figure 9.12
Run Chart

- Diameter vs Time (Hours)

Tracking Improvements

- UCL
- LCL
- Process not centered and not stable
- Process centered and stable
- Additional improvements made to the process

Methods for Generating Ideas

- Brainstorming
- Quality circles
- Interviewing
- Benchmarking
- 5W2H
Quality Circles

- Team approach
- List reduction
- Balance sheet
- Paired comparisons

Benchmarking Process

- Identify a critical process that needs improving
- Identify an organization that excels in this process
- Contact that organization
- Analyze the data
- Improve the critical process