Quality Management

Module 5
“Isn’t it nice when things just work?”

**USA:**
- Huge domestic market, high capacity
- Can’t match US productivity & economies of scale
- Price for competitive advantage

**Europe, Japan:**
- Increased productivity
- Quality for competitive advantage
- Mid-1960’s
- Oversupply
“It’s not necessary to change; survival is not mandatory”

- Deming
* Importance Of Quality

* More than 90% of Dissatisfied Customers NEVER Again Do Business with the Offending Organization

* The Average Customer who has a Problem Tells Nine Others

* Attracting a New Customer Costs Five to Six Times as Much as Keeping the Current Customer
**Quality**: the ability of a product (a good or a service) to consistently meet or exceed customer expectations

- **Ability**: the competence, either native or acquired, that enables one to do something well

- **Consistently**: refers to a reliable or steady pattern of performance

- **Expectations**: a state of anticipation about a future outcome
Quality: Goods vs. Services

1. Goods ➔ Tangible Products. Quality relates to specifications, features, functions, etc.

2. Services ➔ Intangible goods = Intangible Factors
Quality of Goods

1. Performance - operating characteristics
2. Features - “bells and whistles”
3. Reliability - time until/between breakdowns
4. Durability - needs replacement when?
5. Conformance - characteristics meet established standards
6. Serviceability - ease of maintenance
7. Aesthetics - overall appearance/appeal
8. Perceived Quality - perceptions/reputation
Unique Issues:

* 1. Tangibles ➔ Ambiance, beauty, etc.
* 2. Responsiveness ➔ How quickly customer needs are met
* 3. Assurance ➔ Confidence in service provider
* 4. Empathy ➔ Ability to recognize specific needs of customer
### Different Types of Quality

<table>
<thead>
<tr>
<th>Customer satisfaction</th>
<th>Quality of design</th>
<th>Quality of market research</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Quality of concept</td>
<td></td>
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<tr>
<td></td>
<td>Quality of specification</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Technology</td>
<td></td>
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<tr>
<td></td>
<td>Employees</td>
<td></td>
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<tr>
<td></td>
<td>Management</td>
<td></td>
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<td></td>
<td>Reliability</td>
<td></td>
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<tr>
<td></td>
<td>Maintainability</td>
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<td></td>
<td>Logistical support</td>
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<td></td>
<td>Promptness</td>
<td></td>
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<tr>
<td></td>
<td>Field service</td>
<td></td>
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<tr>
<td></td>
<td>Competence</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Integrity</td>
<td></td>
</tr>
</tbody>
</table>
Costs of Quality

*Costs to obtain good quality*
- Prevention
  - design
  - training
- Appraisal
  - inspection
  - testing

*Costs resulting from poor quality*
- Internal Failure
  - scrap
  - rework
- External Failure
  - warranty costs
  - loss of goodwill
Costs of Quality

Note: the closer a failure is to the customer the more expensive it is!!
Profit = Revenue – Cost

→ Revenue is a function of quality
  • ↑ Quality → ↓ Demand elasticity → ↑ Prices → ↑ Revenue
  • ↑ Quality → ↑ Perceived value → ↑ Market share → ↑ Revenue

→ Cost is a function of quality
  • ↑ Quality → ↑ Productivity → ↓ Costs
How Quality Contributes to Profitability

QUALITY
(Design and conformance)

- Reduced waste
- Greater productivity
- Lower Costs

- Improved asset utilization
- Improved margins

Greater Value
- Increased market share
- Revenue growth

IMPROVED PROFITABILITY
- Revenue
- Improved margins
- Increased market share
- Improved asset utilization
- Lower Costs
- Greater productivity
- Reduced waste

IMPROVED PROFITABILITY
- Increased market share
- Revenue growth
- Improved margins
- Revenue
- Improved asset utilization
- Lower Costs
- Greater productivity
- Reduced waste
North American Automakers

PRODUCED 15 million Vehicles in 2004 ---- and RECALLED 25 million.

2014:

Toyota - 6.4 million in April and 2.7 in June

Chevy - 13.8 million by May
What is a Quality Process?

* Quality Process
  * A Process that Produces Error-free Products

* Because of Variation, No Process Produces Error-free Products. So, What Percentage of Defects is Acceptable?
  10 % ?
  5 % ?
  1 % ?
* When 99.9% Quality is Not Enough

* Two million documents would be lost by IRS each year
* 22,000 checks would be deducted from the wrong bank account in the U.S.
* 1,314 phone calls in the U.S. would be misrouted each day
* 12 babies would be given to the wrong parents each day
1999: 98,000 deaths from medical errors in the U.S., 7000 from medication errors.

Hospitals commit 400,000 preventable drug errors each year. Average is 1 per patient per day.

3 to 8 percent of prescriptions are filled incorrectly in U.S.
* Only 80 percent of hospitals in the U.S. have procedures in place to avoid operating on the wrong body parts. (i.e. 20 percent do not!)

* IRS agents give bad or no information 43 percent of the time (in 2002 study by Dept. of Treasury). Guess who is responsible if you use the bad information?
Is 99% Correct Good Enough?

* 20,000 Wrong Prescriptions Each Year
* 15,000 Babies Dropped by Doctors Each Year
* 2 Short or Long Landings at Airports Daily
* 500 Incorrect Surgeries Weekly
* 2,000 Lost Pieces of Mail Each Hour!
* GE, Motorola, and Others Want to be Correct ~99.99966% of the Time --- Thus, only 3.4 Defects per 1 Million Opportunities

* This Is a Six Sigma Standard!
• Total Quality Management
  • Quality
    • What is it?
Overview

- Total Quality Management
- Quality
  - What is it?
  - Dimensions
  - Cost / Importance
- Quality Gurus
- Continuous improvement
* 1. **Total Quality Management (TQM)**
   * A. Term for quality management system that addresses all areas of an organization
   * B. Emphasizes customer satisfaction and uses continuous improvement tools and techniques.

* 2. **Elements of TQM**
   * A. Employee participation
   * B. Customer focus
   * C. Management by fact
   * D. Continuous improvement
Total Quality Management (TQM)

- **Total**: integrated into all business functions
- **Quality**: meeting or exceeding customer expectations
- **Management**: improving business systems/processes

“Managing the entire organization so that it excels on all dimensions of products and services that are important to the customer.”
Quickly Count the “F’s”

Count the F's in the sentence below.
Count them ONLY ONCE.

Do not go back and count them again

“FINISHED FILES ARE THE RESULT OF YEARS OF SCIENTIFIC STUDY COMBINED WITH THE EXPERIENCE OF YEARS.”
*Inspection doesn’t always work
Quickly Count the “F’s”

FINISHED FILES ARE THE RESULT OF YEARS OF SCIENTIFIC STUDY COMBINED WITH THE EXPERIENCE OF YEARS.

Average # of F’s found is 3. There are actually 6
Root Causes of Quality Problems

* “...most quality problems are caused by poor systems, not by the workers.”

* Deming: 90 percent of quality problems are caused by management.

* J.D. Power: at least 2/3 of the long-term quality problems in autos are engineering and design problems.
* 1. Malcolm Baldridge National Quality Award (MBNQA) →
Premiere award recognizing quality in the United States
W. Edwards Deming (b. 1900- d. 1993)

1. Known as “father” of quality management
2. Developed “14 Points”
3. Highlights of “14 Points”
   A. (3) Cease dependence on inspection
   B. (4) Reduce cost by reducing variation
   C. (6) Training
   D. (8) Drive out fear
   E. (10) Eliminate slogans
Dimensions of Quality

The “Abilities”

Quality of Conformance

Field Service

Quality of Design
Who is 42?

Look for these other quality Hanes® products:

• Sweats
• T-Shirts
• Socks
• Gloves

THIS GARMENT INSPECTED BY 42
Who is 4?

It says this garment was inspected by number 4. But what if there's something wrong with it, and number 5 took one of number 4's little tags and put it in the pocket just to get him in trouble?

By golly, you're right! It says here they've just arrested number 5 for impersonating number 4.

Nothing cures a case of overthinking like a dose of sarcasm.
**The Deming Wheel:**

1. **Plan**
   - Plan a change aimed at improvement.

2. **Do**
   - Execute the change.

3. **Check**
   - Study the results. Did it work?

4. **Act**
   - Institutionalize the change (or abandon/repeat)

---

**Execute the change.**
The Quality Cycle

Interpretation of needs

MARKETING
Interprets customer needs
Works with customer to design product to fit operations

CUSTOMER
Specifies quality needs

OPERATIONS
Produces the product or services
QUALITY CONTROL
Plans and monitors quality

ENGINEERING
Defines design concept
Prepares specifications
Define quality characteristics

Concurrent engineering team (QFD)
Implementation of quality improvement through the quality cycle

1. Define quality attributes on the basis of customer needs
2. Decide how to measure each attribute
3. Set quality standards
4. Establish appropriate tests for each standards
5. Find and correct causes of poor quality
6. Continue to make improvements
Even with proactive planning...

... problems can still come up.

That’s OK, as long as we address them by stepping in the right direction toward total quality.
Continuous Improvement

1. Small changes in processes to improve long run quality

2. Requires worker involvement & process monitoring
Continuous Improvement

Seven Tools

1. Process flow charts
2. Cause and effect diagrams
3. Control charts
4. Histograms
5. Check sheet
6. Pareto charts
7. Scatter diagrams (and run charts)
1. Traces flow and sequence of operations in a process

2. Helpful to identify non-value adding activities
1. Illustrates range of possible causes that lead to an outcome (a.k.a. Fishbone or Ishikawa diagram)
Control Charts

1. Used to show process trends
Histogram (of Hole Diameters)

Shows frequency and distribution of data
## Checksheet for Recording Complaints

<table>
<thead>
<tr>
<th>Type of Complaint</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cord too short</td>
<td></td>
</tr>
<tr>
<td>Dirt bags hard to change</td>
<td></td>
</tr>
<tr>
<td>Too heavy</td>
<td></td>
</tr>
<tr>
<td>Breaks down a lot</td>
<td></td>
</tr>
<tr>
<td>Accessories don’t always work</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>
* Checksheets for Group Sizes in a Restaurant

<table>
<thead>
<tr>
<th>Customers in Party</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
</tr>
<tr>
<td>&gt;6</td>
<td></td>
</tr>
</tbody>
</table>
Pareto Analysis

Ranking of causes from most to least significant

80% of the problems may be attributed to 20% of the causes.
*Pareto Charts to Set Priorities*

**Field Service Customer Complaints:**
- **Shipping**: 25 complaints (42% of all complaints)
- **Installation**: 20 complaints
- **Delivery**: 15 complaints
- **Clerical**: 10 complaints
- **Misc.**: 5 complaints

**Cost To Rectify Field Service Complaints:**
- **Installation**: $20,000 (13% of total cost)
- **Clerical**: $15,000
- **Shipping**: $10,000
- **Delivery**: $5,000
- **Misc.**: $0
Pareto Chart of Factors in an Emergency Room

Survey Responses: Factors Requiring Change

Cumulative percent line
* 1. Identify Relationships Between 2 Variables

Scatter Diagram

Hours of Training

Defects

0 2 4 6 8 10 12

0 10 20 30
Scatterplot of Customer Satisfaction and Waiting Time in an Upscale Restaurant
*Main office of a large bank*
  * 500 customer calls/day
  * Caller irritation if phone rings 5x before answer

*Telephone reception importance:*
  * First impression of a business
  * Company slogan “Don’t make customers wait”
  * Company wide campaign to “be more friendly”
*Why Customers Wait*

**Customer B waits if:**

1. Inexperienced operator doesn't know where to connect the Customer A's call.

2. Receiving party cannot answer the phone quickly.
*Cause and Effect Diagram

- Receiving party not present
  - Absent
  - Not at desk
- Out of office
- Lengthy conversation
- Complaining

- Working system of operators
  - Telephone call rush
  - Lunchtime rest
  - Absent
- Does not understand customer’s message
- Takes time to explain branch office location
- Makes customer wait

Customer
Operator
*Checksheet Analysis*

<table>
<thead>
<tr>
<th>Date</th>
<th>Reason Description</th>
<th>Daily Average</th>
<th>Total Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 4</td>
<td>No one present in section receiving the call</td>
<td>14.3</td>
<td>172</td>
</tr>
<tr>
<td>June 5</td>
<td>Receiving party not present</td>
<td>6.1</td>
<td>73</td>
</tr>
<tr>
<td>June 6</td>
<td>Only one operator (partner out of the office)</td>
<td>5.1</td>
<td>61</td>
</tr>
<tr>
<td>June 15</td>
<td>Section and name of receiving party not given</td>
<td>1.6</td>
<td>19</td>
</tr>
<tr>
<td>A</td>
<td>One operator (partner out of the office)</td>
<td>1.3</td>
<td>16</td>
</tr>
<tr>
<td>B</td>
<td>Inquiry about branch office locations</td>
<td>0.8</td>
<td>10</td>
</tr>
<tr>
<td>C</td>
<td>Other reasons</td>
<td>29.2</td>
<td>351</td>
</tr>
</tbody>
</table>

*Pareto Diagram*
* Solutions?
* How to Reduce Number of Waiting Callers?

* 1. Ensure more than one operator on duty
   * Rolling lunch shifts

* 2. Simplify operator duties
   * Notify operator if employee away from desk
   * Compile directory of employees
The solution

Number of waiting callers before and after Quality Program

<table>
<thead>
<tr>
<th>REASON WHY CALLERS HAD TO WAIT</th>
<th>TOTAL NUMBER BEFORE</th>
<th>AFTER</th>
<th>DAILY AVERAGE BEFORE</th>
<th>AFTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>A One operator (partner out of the office)</td>
<td>172</td>
<td>15</td>
<td>14.5</td>
<td>1.2</td>
</tr>
<tr>
<td>B Receiving party not present</td>
<td>73</td>
<td>17</td>
<td>6.1</td>
<td>1.4</td>
</tr>
<tr>
<td>C No one present in the section receiving the call</td>
<td>61</td>
<td>20</td>
<td>5.1</td>
<td>1.7</td>
</tr>
<tr>
<td>D Section and name of receiving party not given</td>
<td>19</td>
<td>4</td>
<td>1.6</td>
<td>0.3</td>
</tr>
<tr>
<td>E Inquiry about branch office locations</td>
<td>16</td>
<td>3</td>
<td>1.3</td>
<td>0.2</td>
</tr>
<tr>
<td>F Others</td>
<td>10</td>
<td>0</td>
<td>0.8</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>351</strong></td>
<td><strong>59</strong></td>
<td><strong>29.2</strong></td>
<td><strong>4.8</strong></td>
</tr>
</tbody>
</table>

Period: 12 days from Aug. 17 to 30.

Effects of Quality Program (Pareto Diagram)
The SERVQUAL system is one method used to measure quality in services. It has five dimensions:

- Tangibles
- Reliability
- Responsiveness
- Assurance
- Empathy
Guidelines for designing, manufacturing, selling, and servicing products.

Selecting an ISO 9000 certified supplier provides some assurance that supplier follows accepted business practices in areas covered by the standard.

Required by many companies, esp. in Europe, before one can be a supplier.

www.iso.ch
ISO 9000 Audit

• Document what you do...

• Do what you say you do.
Turkish bottled water served on a Dutch airline

Following a three-day audit in May, St. Luke’s Hospital was recently informed that it has earned ISO 9001:2000 certification status.

“We are just the second healthcare organization in Ohio, and the first in the greater Toledo area, to earn this certification,” stated Frank J. Bartell III, St. Luke’s president/CEO. “We are truly proud of achieving this designation.”

ISO is the recognized name for International Organization for Standardization, which promotes the development of standards, testing, and certification to ensure quality products and services. Certification is more common in manufacturing and industrial settings. St. Luke’s is among a relatively small number of healthcare organizations nationwide to undergo the ISO 9001:2000 audit procedure, according to the hospital.

Maintaining ISO 9001:2000 certification is a continual process. St. Luke’s will undergo an audit each year to retain its certification status.

St. Luke’s ISO 9001:2000 certification comes after a successful survey by the Joint Commission on the Accreditation of Healthcare Organizations (JCAHO) in March. The JCAHO evaluates more than 17,000 healthcare organizations in the US each year as a means of testing their safety and quality procedures.

“Our ISO 9001:2000 certification and our accreditation by JCAHO tell our customers a few things about St. Luke’s,” stated Bartell. “We maintain the highest level of quality by continually evaluating and improving our internal processes. These improvement processes apply to everything from processing patient records to calibrating medical equipment to maintaining employment applications. We will continue to analyze our processes to ensure that they work for our customers and for our organization.”
Ingredients:
Wheat Flour, Date Paste, Butter, Sugar, Yeast
Keep in a Cool & Dry Place
Produced by:
HALWANI BROS CO.
P.O.Box 690, Jeddah 21421
Kingdom of Saudi Arabia
Design Reference: 16/03/08

Saudi cookies are ISO 9000 certified
Airports can be ISO 9000 certified
Hotels can be ISO 9000 certified
*The ISO 9000 Audit*

- Document what you do...
- Do what you say you do.
ISO 9000

• Document what you do...

• Do what you say you do.
Series of standards covering **environmental management systems**, environmental auditing, evaluation of environmental performance, environmental labeling, and life-cycle assessment.

Intent is to help organizations improve their environmental performance through documentation control, operational control, control of records, training, statistical techniques, and corrective and preventive actions.
ISO 14001 is an environmental certification
Quality is not a new idea.

The label on the bottles reads:

“Brewed according to the German Purity Regulations of 1516”
* What is quality?
* How may increased quality result in higher revenues or reduced costs?
* What are the standards or quality for goods versus services?
* What standard (99%?) is used in quality control?
* Steps important in quality improvement
* Tools to assist in continuous improvement
* Goal of ISO 9000/9001
* Goal of ISO 14000/14001