CHAPTER 1
INTRODUCTION TO QUALITY MANAGEMENT

Expected Outcomes
Understand the complexities of defining quality
Explain the philosophies of quality management and continuous improvement
Recognize that processes perform value-added activities and variation is present in any natural process
To gain insight into the evolution of Total Quality Management (TQM) concepts
Chapter Outline

• Introduction
• Defining Quality
• Quality aspect
• Dimensions of Quality
• Three sphere of Quality
• Evolution of Quality
• TQM
  • Framework
  • Obstacles
  • Benefits of TQM
• Gurus of Quality / TQM
What is Quality?
Quality Definition

• Definition of quality are:
  ❖ Meet the specification
  ❖ Satisfying customer need
  ❖ Fitness for purpose

* Quality of a product or services is its ability to satisfy the needs and expectations of the customer
Quality Definition

Some of the definitions of the term ‘Quality', provided by quality gurus are as follows:

- Quality is fitness for use (JURAN)
- Quality is conformance to requirements (CROSBY)
- The efficient production of the quality that the market expects (DEMING)
- Quality is what the customer says, it is (FEIGENBAUM)
Quality Definition

• Quality is the loss that a product costs to the society after being shipped to the customer (TAGUCHI)

• The totality of features and characteristics of a product or services that bear on its ability to satisfy stated or implied needs of the customers (ASQC)

• A quality system is the agreed on company wide and plant wide operating work structure, documented in effective, integrated, technical and managerial procedures for guiding the co-coordinated actions of people, the machines, or the information of company in the best and most practical ways to assume customer quality satisfaction and economical costs of quality. (FEIGENBAUM)
Modern Quality Definition

• “Quality is inversely proportional to variability”
  \[ \text{Quality} \propto \frac{1}{\text{Variability}} \]

• This definition acknowledges that variability is present in all processes. Sources of variability include:
  1. Process variability includes raw materials, machines, operators and environmental conditions
  2. Measurement variability
  3. Sampling variability

• Given that quality is inversely proportional to variability, so it means by improving quality, we will reducing variability.
Quality Can be Quantified as

\[ Q = \frac{P}{E} \]

where  
- \( Q \) = quality;  
- \( P \) = performance  
- \( E \) = expectations

- If \( Q > 1.0 \): then the customer has a good feeling about the product/service.
- \( P \) and \( E \) are determined based on perception.
- \( P \) is determined by the organization and \( E \) by the customers.
- Customer expectations are becoming more demanding from day-to-day.
Essence of Quality

As requested by sales

As analyzed by marketing

As designed by engineering

As produced by the factory

As installed by the field engineers

What the user really wanted

Where does QUALITY apply?

Understanding the Basics Process
Aspect of Quality

Understanding the Basics Process
Aspect of Quality

1) Quality of design (consumer’s perspective)
   - determine the Q characteristics of products that suited to the needs & wants of a market at a given cost.

2) Quality of conformance (manufacturer’s perspective)
   - ability of firms and it’s supplier to produce the product with predictable degree of uniformity & dependability as in Q of design.

3) Quality of performance
   - studies focus on determining how the Q characteristics identified in Q of design & improved and innovated in Q of conformance
## Product Quality Dimensions

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Meaning and Example</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Performance</td>
<td>Primary product characteristics, such as brightness of the picture</td>
<td>will the product do the intended job?</td>
</tr>
<tr>
<td>2. Features</td>
<td>Secondary characteristics (i.e. added features), such as remote control</td>
<td>what does the product do?</td>
</tr>
<tr>
<td>3. Conformance</td>
<td>Meeting specifications or industry standards, workmanship</td>
<td>Did the product match with the preestablished standard?</td>
</tr>
<tr>
<td>4. Reliability</td>
<td>Consistence performance over time, average time for the product/unit to fail</td>
<td>how often the product fails?</td>
</tr>
<tr>
<td>5. Durability</td>
<td>Useful life, includes repair</td>
<td>how long the product lasts?</td>
</tr>
<tr>
<td>6. Service</td>
<td>Resolution of problems and complaints, ease of repair</td>
<td>how easy is it to repair the product?</td>
</tr>
<tr>
<td>7. Response</td>
<td>Human-to-human interface, such as courtesy of the dealer</td>
<td></td>
</tr>
<tr>
<td>8. Aesthetics</td>
<td>Sensory characteristics, such as exterior finish</td>
<td>what does the product look like?</td>
</tr>
<tr>
<td>9. Reputation</td>
<td>Past performance and other intangibles, such as being ranked first/best</td>
<td>what is the reputation of a company or its products?</td>
</tr>
</tbody>
</table>

*Source: Garvin, 1988*
Product Quality Dimensions

• These 9 dimensions are independent, therefore a product may be excellent in one dimension and average or poor in another.

• Very few products excel in all 9 dimensions.

• **Example:** In 1970s, the Japanese were cited for high quality cars based only on the dimensions of RELIABILITY, CONFORMANCE and AESTHETICS.

• These dimensions been translated into the requirements for the development of a new product or the improvement of an existing one.
# Service Quality Dimensions

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Meaning and Example</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Timeliness</td>
<td>Delivery of service within the agreed lead time</td>
<td>Will a service be performed when promised?</td>
</tr>
<tr>
<td>2. Completeness</td>
<td>Addresses the delivery of the order in full</td>
<td>Are all items in order included?</td>
</tr>
<tr>
<td>3. Availability</td>
<td>Ability to provide service at the right time and place</td>
<td>Is the service easy to obtain?</td>
</tr>
<tr>
<td>4. Pleasantness/Courtesy</td>
<td>The good manners and politeness of the service provider</td>
<td>Do frontline employees greet each customer cheerfully?</td>
</tr>
<tr>
<td>5. Responsiveness</td>
<td>Willingness of the service provider to be prompt in delivering the service</td>
<td>Can service personnel react quickly and resolve unexpected problems?</td>
</tr>
<tr>
<td>6. Empathy</td>
<td>Ability of the service provider to demonstrate care and individual attention to the customer</td>
<td></td>
</tr>
<tr>
<td>7. Tangibles</td>
<td>The physical appearance of the service facility and people</td>
<td></td>
</tr>
<tr>
<td>8. Assurance</td>
<td>Ability of the service provider to inspire trust and confidence</td>
<td></td>
</tr>
<tr>
<td>9. Reliability</td>
<td>The consistency of performance and dependability</td>
<td>Is the service performed right the first time?</td>
</tr>
</tbody>
</table>

*Source: Parasuraman et.al, 1988*
Three Sphere of Quality

- Quality Assurance
- Quality Control
- Quality Management
Three Sphere of Quality
# QA vs QC

<table>
<thead>
<tr>
<th>QUALITY</th>
<th>PRINCIPLE</th>
<th>PURPOSE</th>
<th>WHEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASSURANCE</td>
<td>Prevention of problem</td>
<td>To avoid the same problem repeated and provide the assurance to customer</td>
<td>Before product starts to process or before product deliver to customer</td>
</tr>
<tr>
<td>CONTROL</td>
<td>Detection of problem</td>
<td>To verify whether the process is carried out correctly</td>
<td>At the stage of critical</td>
</tr>
</tbody>
</table>
Activities of QA, QC and QM

<table>
<thead>
<tr>
<th>QA</th>
<th>QC</th>
<th>QM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide effective training to operators.</td>
<td>QC testing</td>
<td>Planning for quality improvement</td>
</tr>
<tr>
<td>Implement preventive maintenance on machine</td>
<td>Incoming material inspection</td>
<td>Creating a quality organizational culture</td>
</tr>
<tr>
<td>Conduct supplier rating to ensure quality of materials</td>
<td>Finished goods inspection</td>
<td>Providing training and retraining</td>
</tr>
<tr>
<td>Establish procedures and work instructions</td>
<td>Process testing / monitoring</td>
<td>Designing and organizational system that reinforce quality ideas</td>
</tr>
<tr>
<td>Machine/process upgrade (manual to auto @ semi-auto)</td>
<td>Operating parameters monitoring</td>
<td>Facilitating organizational communication</td>
</tr>
<tr>
<td>Establish product or design specification</td>
<td>Repairing of machines</td>
<td></td>
</tr>
</tbody>
</table>
Total Quality Management

• Total Quality Management (TQM) is an enhancement to the traditional way of doing business.
• It’s a proven technique to guarantee survival in world-class competition
• TQM integrates fundamental management techniques, existing improvement efforts and technical tools under a disciplined approach
• It is the application of quantitative methods and human resources to improve all the processes within an organization and exceed customer needs now and in the future.
# New and Old Culture

<table>
<thead>
<tr>
<th>Quality Element</th>
<th>Previous State</th>
<th>TQM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition</td>
<td>Product-oriented</td>
<td>Customer-oriented</td>
</tr>
<tr>
<td>Priorities</td>
<td>Second to service and cost</td>
<td>First among equals of service and cost</td>
</tr>
<tr>
<td>Decisions</td>
<td>Short-term</td>
<td>Long-term</td>
</tr>
<tr>
<td>Emphasis</td>
<td>Detection</td>
<td>Prevention</td>
</tr>
<tr>
<td>Errors</td>
<td>Operations</td>
<td>System</td>
</tr>
<tr>
<td>Responsibility</td>
<td>Quality Control</td>
<td>Everyone</td>
</tr>
<tr>
<td>Problem Solving</td>
<td>Managers</td>
<td>Teams</td>
</tr>
<tr>
<td>Procurement</td>
<td>Price</td>
<td>Life-cycle costs, partnership</td>
</tr>
<tr>
<td>Manager’s Role</td>
<td>Plan, assign, control and enforce</td>
<td>Delegate, coach, facilitate and mentor</td>
</tr>
</tbody>
</table>
New and Old Culture

Gurus

Shewhart
Deming
Juran
Ishikawa

Tools and Techniques

Benchmarking
QMS
EMS
Products & Service Liability
QFD
FMEA
TPM
SPC
Taguchi’s Quality Eng.
Experimental Design

Principles and Practices

People & Relationships:
Leadership
Customer Satisfaction
Employee Involvement
Supplier Partnership

Product or Service Realization

Approach:
Continuous Process Improvement

Measure:
Performance Measures

Customer
Obstacles of TQM

• Lack of Management Commitment
• Inability to Change Organizational Culture
• Improper Planning
• Lack of Continuous Training and Education
• Incompatible Organizational Structure and Isolated Individuals and Departments
• Ineffective Measurement Techniques and Lack of Access to Data and Results
• Paying Inadequate Attention to Internal and External Customers
• Inadequate Use of Empowerment and Teamwork
• Failure to Continually Improve
Benefits of TQM

The benefits of TQM are improved:

- Quality
- Employee Participation
- Teamwork
- Working Relationships
- Customer Satisfaction
- Employee Satisfaction
- Productivity
- Communication
- Profitability
- Market Share
## Gurus of TQM

<table>
<thead>
<tr>
<th>Gurus</th>
<th>Known For</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walter A. Shewhart</td>
<td>Statistical Process Control Chart and PDSA Cycle</td>
</tr>
<tr>
<td>W. Edwards Deming</td>
<td>Provide a theory for management to improve quality, productivity and competitive position (14 points)</td>
</tr>
<tr>
<td>Joseph M. Juran</td>
<td>Processes for Managing Quality</td>
</tr>
<tr>
<td>Armand V. Feigenbaum</td>
<td>Authored Total Quality Control</td>
</tr>
<tr>
<td>Kaoru Ishikawa</td>
<td>Development of the Cause and Effect Diagram, Quality Circle Concept (QCC)</td>
</tr>
<tr>
<td>Philip B. Crosby</td>
<td>Authored Quality Without Tears</td>
</tr>
<tr>
<td>Genichi Taguchi</td>
<td>Developed Loss Function Concept</td>
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