Total Quality Management
Backgrounds & Concepts

Anont Wonggasem
Department of Industrial Engineering
Faculty of Engineering
Kasetsart University
Agenda

- Quality Definition
- The Quality Evolution
- Managing Quality
- TQM Pioneers
- TQM in Perspective
- TQM Models
- TQM for Education
Quality Definition

- Conventional Definitions
- Contemporary Definitions
- Quality Stages
- Quality Ladder
Quality Definitions : Conventional

- Quality is degree of excellent.
- Quality means fitness for use.
- Quality means conformance to standard.
- Quality means conformance to specification.
- Quality is inversely proportional to variability.
Quality Definitions: Contemporary

- Ability to satisfy needs.
- Conformance to customer requirements.
- Customer satisfaction.
- Customer delights.
Quality car?
Quality stages

- quality of design
- quality of conformance
- quality of performance
Dimensions of Quality – Transmission Example

![Diagram showing distributions of critical dimensions for transmissions.](image)

**Figure 1-2** Distributions of critical dimensions for transmissions.
QUALITY LADDER

- QUALITY
- Q. DIMENSIONS
- Q. CHARACTERISTICS
- Q. SPECIFICATIONS
Quality Dimension

**Product**
- Performance
- Features
- Conformity
- Reliability
- Durability
- Serviceability
- Aesthetics
- Perceived Quality

**Service**
- Responsiveness
- Empathy
- Courtesy
- Accuracy
- Systematic
- Tangible
Quality Characteristics

- **Physical** - length, weight, voltage, viscosity
- **Sensory** - taste, appearance, color
- **Time Orientation** - reliability, durability, serviceability
Quality Characteristics Data

- **Attributes Data** - discrete data, often in the form of counts.

- **Variables Data** - continuous measurements such as length, weight.
Specifications

Quality characteristics being measured are often compared to standards or specifications.

- Nominal or target value
- Upper Specification Limit (USL)
- Lower Specification Limit (LSL)
Quality Engineering Terminology

- When a component or product does not meet specifications, they are considered to be **nonconforming**.
- A nonconforming product is considered **defective** if it has one or more **defects**.
- **Defects** are nonconformities that may seriously affect the safe or effective use of the product.
NC

DEFECT → NONCONFORMITY
DEFECTIVE → NONCONFORMING
NONCONFORMANCE
NC Classification

- Critical
- Major
- Minor
THE QUALITY EVOLUTION

INFORMATION

INSPECTION

QUALITY CONTROL (QC)

QUALITY ASSURANCE (QA)

TOTAL QUALITY MANAGEMENT (TQM)
Inspection Era

- Post industrial revolution quality control method.
- Main focus on product, specification and/or standard.
- Resulted in mass inspection, fleet of inspectors and inspection department.
- High quality at high cost.
- A verification activity which may create quality policing culture.
## Verification and other activities for quality

### Verification
- Inspection
- Audit
- Assessment
- Surveillance

### Other types activities
- Monitor
- Review
- Validation
Quality Control Era

- Application of PDCA cycle (Deming cycle or Shewhart cycle)
- Application of statistical methods
  - Control charts
  - Sampling plan
  - QI tools
  - Design of Experiments (DOE)
- First focused on product characteristics and then process parameters. (SQC to SPC)
Quality Assurance Era

- Quality means conformance to customer requirements and/or customer satisfaction.
- Other business processes were integrated in; marketing, design, engineering, procurement, production, services, HRM, administration etc.
- Focus on business processes and systems.
- Empowering of line departments.
- QA become supporting staff and coordinators.
Total Quality Management

- Focus on management;
  Planning – Organizing - Directing - Controlling
- Encourage participation in the organization and supply chain.
- The wholeness approach on quality.
- National quality award as a model
Managing Quality

- Planning
- Organizing
- Directing
- Controlling
<table>
<thead>
<tr>
<th>Managing Quality: Planning</th>
</tr>
</thead>
<tbody>
<tr>
<td>■ Mission</td>
</tr>
<tr>
<td>■ Vision</td>
</tr>
<tr>
<td>■ Strategies</td>
</tr>
<tr>
<td>■ Goals</td>
</tr>
<tr>
<td>■ Objectives</td>
</tr>
<tr>
<td>■ Process</td>
</tr>
<tr>
<td>■ Tactic</td>
</tr>
<tr>
<td>■ Operation</td>
</tr>
<tr>
<td>■ Budget</td>
</tr>
</tbody>
</table>
Managing Quality: Organizing

- Work design
- Organization structure
- Organization culture
- Chain of command
- Authority – responsibility – accountability
- Line – staff
- Team work
Managing Quality: Directing

- Human resource management (HRM)
  - Recruitment & Selection
  - Orientation & training
  - Compensation & benefits
  - Performance Appraisal
  - Career advancement

- Leading
- Motivating
- Empowerment
- Delegation
## Managing Quality: Controlling

- Monitor
- Measurement & Analysis
- Verifications
- Review
- Report & feedback
- Data & information

- Corrective action
- Preventive action
- Improvement
- Innovation
TQM Pioneers

- W. Edwards Deming
- Joseph M. Juran
- Philip B. Crosby
- Armand V. Feigenbaum
- Kaoru Ishikawa
- Shigeo Shingo
- Genichi Taguchi
W. Edwards Deming

- Taught engineering, physics in the 1920s, finished PhD in 1928
- Met Walter Shewhart at Western Electric
- Long career in government statistics, USDA, Bureau of the Census
- During WWII, he worked with US defense contractors, deploying statistical methods
- Sent to Japan after WWII to work on the census
History of Dr. W. Edwards Deming

- Born in 1900
- 1928 – Received PhD in Physics
- 1946 – Led formation of American Society for Quality Control
- mid-1940s – TQM developed
- late 1940s – Introduced statistical quality control to Japan
- 1951 – Japan created Deming Award
- 1970s-1980s – Ford, IBM, Xerox adopt TQM
- 1980 – Deming “Discovered” in America
In his last book, Dr. Deming explained the "System of Profound Knowledge" that he developed to enable business to make the necessary transformation for success in today's world.

Deming also shared his thoughts on Leadership, Management, Variation, Shewhart's Charts, and other topics.

This book was completed shortly before his death in 1993 and is a valuable reference for all quality professionals.
Deming’s achievements

- Planted statistical quality control in Japanese industries.
- Cultivated PDCA cycle (usually known as Deming cycle) every level of organizational hierarchy.
- Inspired Japanese national quality with Deming Prize Award.
- Conceptualized management principles guiding the Total quality management (TQM)
Deming Prize-2001 for Thai Acrylic Fibre's TQM Excellence
Deming’s 14 Points

1. Create constancy of purpose toward improvement
2. Adopt a new philosophy, recognize that we are in a time of change, a new economic age
3. Cease reliance on mass inspection to improve quality
4. End the practice of awarding business on the basis of price alone
5. Improve constantly and forever the system of production and service
6. Institute training
7. Improve leadership, recognize that the aim of supervision is help people and equipment to do a better job
8. Drive out fear
9. Break down barriers between departments
10. Eliminate slogans and targets for the workforce such as zero defects
11. Eliminate work standards
12. Remove barriers that rob workers of the right to pride in the quality of their work
13. Institute a vigorous program of education and self-improvement
14. Put everyone to work to accomplish the transformation

Note that the 14 points are about change
Deming’s 7 Deadly Diseases

1. Lack of constancy of purpose
2. Emphasis on short-term profits
3. Performance evaluation, merit rating, annual reviews
4. Mobility of management
5. Running a company on visible figures alone
6. Excessive medical costs for employee health care
7. Excessive costs of warranties
The Deming Cycle (PDCA Cycle)

1. Plan
   Identify problem
   Develop plan for improvement

2. Do
   Implement plan on test basis

3. Study / Check
   Is the plan working

4. Act
   Institutionalize improvement
   Continue cycle
Dr. Joseph M. Juran

- Born in Romania (1904), immigrated to the US
- Worked at Western Electric, influenced by Walter Shewhart
- Emphasizes a more strategic and planning oriented approach to quality than does Deming
- Juran Institute is still an active organization promoting the Juran philosophy and quality improvement practices
The Juran Trilogy

Juran’s Quality Handbook
Fifth Edition

Quality Planning
Quality Control
Quality Improvement
Quality is free . . . :

“Quality is free. It’s not a gift, but it is free. What costs money are the unquality things -- all the actions that involve not doing jobs right the first time.”
Philip B. Crosby

Absolutes of Quality Management:
- Quality means conformance to requirements
- Problems are functional in nature
- There is no optimum level of defects
- Cost of quality is the only useful measurement
- Zero defects is the only performance standard

www.philipcrosby.com
A.V. Feigenbaum

- Three Steps to Quality
  - Quality Leadership, with a strong focus on planning
  - Modern Quality Technology, involving the entire work force
  - Organizational Commitment, supported by continuous training and motivation
Dr. Armand Feigenbaum
Kaoru Ishikawa

- Advocated the use of simple visual tools and statistical techniques
- Influenced participative approaches involving all workers
- Father of Quality Circle
- Instrumental in developing Japanese quality strategy
Shigeo Shingo

- Poka-Yoke
- SMED
- JIT Production
- Zero Defects
Genichi Taguchi

- Pioneered a new perspective on quality based on the economic value of being on target and reducing variation and dispelling the traditional view of conformance to specifications:

![Diagram showing loss and no loss regions within a tolerance range from 0.480 to 0.520]
TQM in Perspective

- Total Product/Service Quality
- Total Customers & Stakeholders
- Total Business Process
- Total Organization
- Total Participation and Teamwork
- Total Knowledge
Total Product

- Core Product
- Formal Product
- Augmented Product
Total Quality Dimensions

Manufacturing Dimensions
- Performance
- Features
- Reliability
- Conformance
- Durability
- Serviceability
- Aesthetics
- Perceived quality

Service Dimensions
- Reliability
- Responsiveness
- Assurance
- Empathy
- Tangibles

Quality of Design
Quality of Conformance
Quality of Performance
Total Customers & Stakeholders

Stakeholders = Shareholders + Employees + Suppliers + Customers + Communities + .. + parties in common interests.

- Customer is principal judge of quality.
- Organizations shall first understand customers’ needs and expectations in order to meet and exceed them.
- Organizations shall build relationships with customers.
- Organization shall work as team with suppliers.
- Organization shall contribute to society at large.
Total Business Process

- Marketing
- Designing
- Process Engineering
- Purchasing
- Manufacturing
- Quality Assurance
- Delivery and After Sale Service
- Disposal after use
Total Participation and Teamwork

- Employees know their jobs best and therefore, how to improve them.
- Management must develop the systems and procedures that foster participation and teamwork.
- Empowerment better serves customers, and creates trust and motivation.
- Teamwork and partnerships must exist both horizontally and vertically.
TQM Knowledge

- SPC
- MSA
- DOE
- Benchmarking
- QFD
- Poka Yoke
- QI Tools
- BPR
- Six Sigma
- FMECA
- Reliability
- ISO 9000
- Standards
- BPR
- Six Sigma
- ISO 9000
- Standards
TQM Models

- Value Model
- Deming Prize Model
- MBNQA Model
- European Model
- TQA Model
Six basic concepts of TQM

compare to 8 management principles of ISO9000:2000

- customer focus
- total employee involvement
- process centered
- integration system
- strategic and systematic approach
- continual improvement
- fact-based decision making
- communications
Value Model

- Quality leadership
- Improvement focus
- Management by fact
- Employee involvement and development
- Quick response
- Process Management
- Good Citizenship
- Partnership in supply chain

Customer value driven
1. Visionary Leadership
2. Learning-centered education
3. Organizational and Personal Learning
4. Valuing faculty, staff, and partners
5. Agility
6. Focus on the Future
7. Managing for Innovation
8. Management by Fact
9. Social Responsibility
10. Focus on Results and Creating Value
11. System Perspective
Deming Prize: Criteria Basis

- Policy
- Org. and development
- Information
- Analysis
- Planning for the future
- Education and training
- Quality assurance
- Quality effects
- Standardization
- Control
MBNQA Model

1. Leadership
2. Strategic Planning
3. Customer & Market Focus
4. Information and Analysis
5. Human Resource Focus
6. Process Management
7. Business Results

CUSTOMER AND MARKET FOCUSED STRATEGY AND ACTION PLANS
European Model

Enablers

Leadership
- People
  - Policy & Strategy
  - Partnerships & Resources

Processes
- People
  - Results
- Customer
  - Results
- Society
  - Results

Results

Innovation and Learning

European Business Excellence Model Nine Criteria
TQM & TQA

1. Leadership
2. Strategic Plan
3. Customer Focus
4. Information & KM
5. Human Focus
6. Process Management
7. Results

Customer Satisfaction
Goals / Strategies
Concepts
Motivation Approach
Vehicles
Techniques
Intrinsic Technology
General Education/Political Stability

Model TQA มี 7 หมวด 11 Core Value
เกณฑ์คุณภาพการบริหารจัดการภาครัฐ พ.ศ. 2548
PMQA : Public Management Quality Award

1. การนำองค์กร
2. การวางแผน เชิงยุทธศาสตร์และกลยุทธ์
3. การให้ความสำคัญกับผู้บริการและผู้มีส่วนได้ส่วนเสีย
4. การวัด การวิเคราะห์และการจัดการความรู้
5. การมุ่งเน้นทรัพยากรบุคคล
6. การจัดการกระบวนการ
7. ผลลัพธ์การดำเนินการ

P : ลักษณะสำคัญขององค์กร
สภาพแวดล้อม ความสัมพันธ์และความท้าทาย
รูปแบบจัดการกระบวนการของระบบบริหารจัดการคุณภาพ

Legend:
- มูลค่าเพิ่ม
- ข้อมูล
<table>
<thead>
<tr>
<th>1</th>
<th>การนำองค์การอย่างมีวิสัยทัศน์</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>ความรับผิดชอบต่อสังคม</td>
</tr>
<tr>
<td>3</td>
<td>การให้ความสำคัญกับพนักงานและคู่ค้า</td>
</tr>
<tr>
<td>4</td>
<td>ความเป็นเลิศที่มุ่งเน้นที่ลูกค้า</td>
</tr>
<tr>
<td>5</td>
<td>การมุ่งเน้นอนาคต</td>
</tr>
<tr>
<td>6</td>
<td>ความคล่องตัว</td>
</tr>
<tr>
<td>7</td>
<td>การเรียนรู้ขององค์การและแต่ละบุคคล</td>
</tr>
<tr>
<td>8</td>
<td>การจัดการเพื่อนวัตกรรม</td>
</tr>
<tr>
<td>9</td>
<td>การจัดการโดยใช้ข้อมูลจริง</td>
</tr>
<tr>
<td>10</td>
<td>การมุ่งเน้นที่ผลลัพธ์และการสร้างคุณค่า</td>
</tr>
<tr>
<td>11</td>
<td>มุ่งมั่นอย่างเชิงระบบ</td>
</tr>
</tbody>
</table>
TQM in Education

- Deming philosophy and model
- Baldrige framework
- My model
"Management by results is confusing special causes with common causes."

"We should work on the process, not the outcome of the processes."

*W. Edwards Deming*
“Monetary rewards are not a substitute for intrinsic motivation.”

“A goal without a method is nonsense.”

W. Edwards Deming
Deming System Model Applied to Education

MISSION or AIM [Why the system exists]

Grand Blanc Community Schools as an innovative leader in providing quality and equitable education will develop all individuals to the highest potential for living in an ever-changing world.

- Continuous Design and Redesign
  - Affects Instruction
  - Affects Quality Education
  - Affects

- Suppliers and System Inputs
- Instruction
- Quality Education

Customer Research

- Customers
  - Students
  - Parents
  - Higher Ed
  - Employers
  - Community
Education: Baldrige Framework

1. Leadership
2. Strategic Planning
3. Student, Stakeholder, and Market Focus
4. Measurement, Analysis, and Knowledge Management
5. Faculty and Staff Focus
6. Process Management
7. Organizational Performance Results
TQM in Education: My model

- Management leadership
- Strategy, policy and plan
- Quality system
- Operation
- Result
- Audit and verifications
- Measurement and analysis
- Review
- Improvement
- HRM
- Physical resources
WEBSITES

- [www.deming.org](http://www.deming.org) W. Edwards Deming Institute
- [www.asq.org](http://www.asq.org) American Society for Quality
- [www.juran.com](http://www.juran.com) Juran Institute
- [www.tqa.or.th](http://www.tqa.or.th) Thailand Quality Awards

The End