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The Philosophy of TQM
An Overview

TQM = Customer-Driven Quality Management

References for Lecture:

Background Reference Material on Web: The Philosophy of TQM by Pat Hammett

Customer Quality Measures

Customers typically relate quality to:

1) Feature-based measures ("have or have not")
   - determined by design
   - diamond example: marquise shape diamond vs. round diamond

2) Performance measures ("range of values")
   - conformance to design or ideal value
   - diamond example: 4Cs -- carat, clarity, color, cut

In this class, we will focus more on analyzing performance measures.

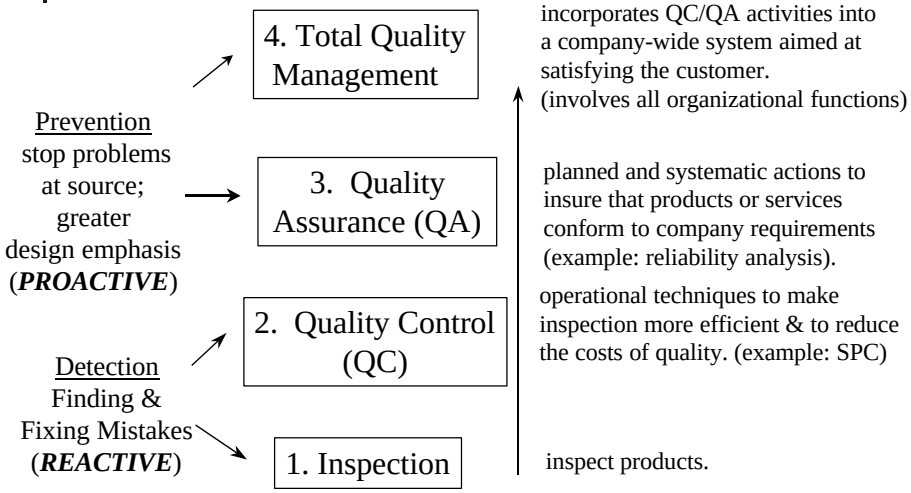
What are the Different Views of Quality?

- Customer's View (*more subjective view*):
  - quality of the design (look, feel, and function).
  - consider both feature and performance measures to assess value
    - Value = Quality / Price (value determined by individual customers)
- Producer's View (*more objective view*):
  - conformance to requirements (term coined by Philip Crosby).
    - e.g., # of defects per million products is a measure of conformance.
  - costs of quality (prevention, appraisal, scrap & warranty costs).
    - prevention costs: training, writing quality procedures
    - appraisal costs: inspecting and measuring product characteristics
    - scrap and rework costs: internal costs of defective products
    - warranty costs: external costs for product failures in the field
  - increasing quality conformance reduces product costs and raises profits.

History of Quality Paradigms (producer / customer relationship)

- Customer-craft quality paradigm:
  - design and build each product for a ***particular*** customer.
  - producer knows the customer directly.
- Mass production and inspection quality paradigm:
  - focus on designing and building products for mass consumption.
    - push products on the customer (limit customer choices).
    - quality is maintained by inspecting and ***detecting*** bad products.
  - major innovation to this paradigm: statistical process control
- TQM or "Customer-Driven Quality" paradigm:
  - potential customers determine what to design and build.
  - higher quality obtained by focusing on ***preventing*** problems and continuously reducing variability in all organizational processes.

The Quality Hierarchy (Evolution)



TQM Defined

TQM is a management philosophy which seeks to integrate all organizational functions (marketing, finance, design, engineering, production, customer service ...) to focus on meeting customer needs and organizational objectives.

It views organizations as a collection of processes. It maintains that organizations must strive to continuously improve these processes by incorporating the knowledge and experiences of workers.

The Simple Objective of TQM

"Do the right things, **right**
the first time, every time."

Some Basic Tenets of TQM

1. The ***customer*** determines quality.
2. Improving quality requires the establishment of effective ***quality metrics***. We must speak with data not just opinions.
3. ***People*** working within ***systems*** create quality.
4. Quality is a moving target. It requires a commitment toward ***sustained*** continuous improvement.
5. ***Prevention not detection*** is the key to producing high quality. We must design quality into products and reduce variability.
6. Top Management must provide leadership and support for all quality initiatives.

APPENDIX: Innovators of Modern Quality Thinking

U.S. Quality Innovators and the Main Years of their Work:

- Walter Shewhart (1920s -1940s)
- W. Edwards Deming (post WWII through 1980s)
- Joseph M. Juran (consultant post WWII through 1980s)
- Philip Crosby (1980s)
- Armand Feigenbaum (1970s - 1980s)

Japanese Quality Innovators:

- Kaoru Ishikawa (post WWII - 1980s)
- Genichi Taguchi (1960s - 1980s)
- Shigeo Shingo (post WWII - 1980s)

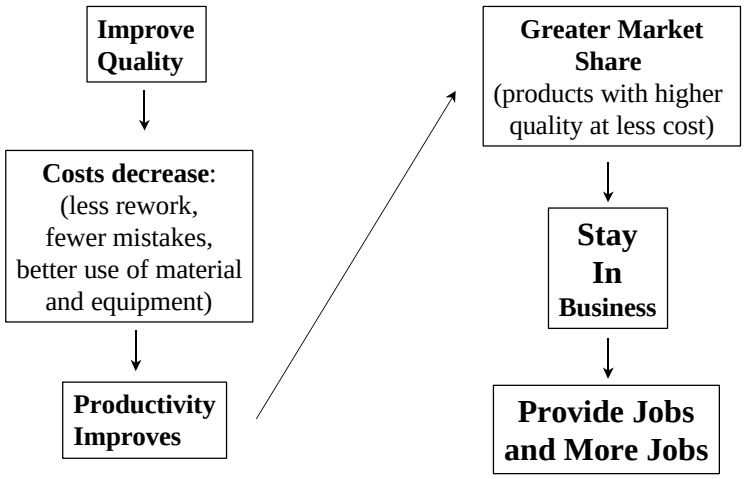
Walter A Shewhart

- Pioneer of Modern Quality Control
  - recognized the need to separate variation into assignable and unassignable causes (defined “in control”.)
  - “founder of the control chart” (e.g. X-bar and R chart).
  - originator of the plan-do-check-act cycle.
  - perhaps the first to successfully integrate statistics, engineering, and economics.
  - defined quality in terms of objective and subjective quality
    - objective quality: quality of a thing independent of people.
    - subjective quality: quality is relative to how people perceive it. (value)

W. Edwards Deming

- Studied under Shewhart at Bell Laboratories
- Contributions:
  - well known for helping Japanese companies apply Shewhart's statistical process control.
  - ***Main Contribution is his Fourteen Points to Quality*** (some key points below)
    - create constancy of purpose.
    - cease mass production - build quality into products.
    - drive out fear and build employee trust.
    - break down departmental barriers (create win-win situations).
    - seek long-term supplier relationship (end low cost bidding).
    - eliminate numerical goals; abolish annual rating or merit system.
    - eliminate slogans - they provide no value in terms of improving quality.

The Deming Chain Reaction
(proposed W. Edwards Deming)



Joseph M. Juran

- Contributions
  - also well-known for helping improve Japanese quality.
  - directed most of his work at executives and the field of quality management.
  - developed the *Juran Triology* for managing quality:
    - Quality planning, quality control, and quality improvement.
  - enlightened the world on the concept of the *vital few, trivial many* which is the foundation for pareto charts.

Other US Quality Innovators

- Philip Crosby (quality management)
  - Four absolutes of quality including:
    - #1- quality is defined by conformance to requirements.
    - #2 - system for causing quality is prevention not appraisal.
    - #3 - performance standard is zero defects, not close enough.
    - #4 - measurement of quality is the cost of nonconformance
- Armand Feigenbaum
  - Stressed a systems approach to quality (all organizations must be focused on quality)
  - Costs of quality may be separated into costs for prevention, appraisal, and failures (e.g., scrap, warranty).

Kaoru Ishikawa

- developed concept of true and substitute quality characteristics
  - true characteristics are the customer's view
  - substitute characteristics are the producer's view
  - degree of match between true and substitute ultimately determines customer satisfaction.
- advocate of the use of the 7 tools (e.g., cause-and-effect diagram)
- advanced the use of quality circles (worker quality teams).
- developed concept of Japanese Total Quality Control
  - quality first - not short term profits.
  - next process is your customer.
  - use facts and data to make presentations.
  - respect for humanity as a management philosophy - full participation.
  - cross-functional management.

Other Quality Innovators

- Genichi Taguchi (1960s - 1980s)
  - quality loss function (deviation from target is a loss to society).
  - Promoted the use of parameter design (application of Design of Experiments) or robust engineering.
- Shigeo Shingo (post WWII - 1980s)
  - advocated the replacement of statistical process control with *source inspection* (control quality at the source, rather than through sampling inspections).
  - set up poke-yoke devices (mistake proofing devices) such as sensors and monitors to identify defects at the point they occur.
  - referred to his system as a "zero defect" approach because Zero Defects is the ultimate goal.