

Total Quality Management and Cost of Quality

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The International Quality movement

- Operator Quality Control
- Foreman (Supervisor) Quality Control
- Full-time Inspectors
- Statistical Quality Control
- Total Quality Control
- Total Quality Management

Total Quality Management

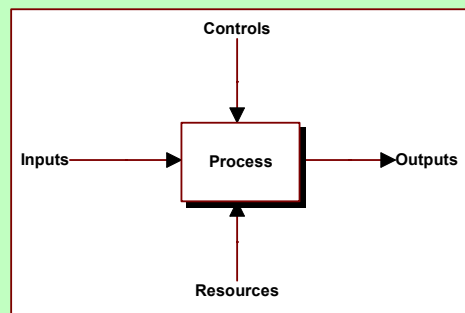
Total Quality Management (TQM) is a philosophy and involves company practices that aim to harness the human and material resources of an organization in the most effective way to achieve the objectives of the organization

(BS 7850)

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What is a Process?

Any activity that accepts inputs, adds values to these inputs for customers, and produces outputs for these customers. The customer may be either internal or external to the organization



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Typical Process of TQM

- **Policy and strategy of the organization**
 - Mission
 - Leadership and commitment
 - Divisional objectives
- **Management of the organization**
 - Organization structure
 - Management system
 - Information system
 - Communication
- **Improvement of the organization**
 - Working environment
 - Measurement of performance
 - Improvement objectives
 - Improvement plans
 - Monitor and review

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Presentation Outline

- Fundamental Concepts
- Implementing Total Quality Management
- Quality Improvement
- Managing for Quality Improvement
- Tools for Quality Improvement
- Quality Gurus
- Cost of Quality

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Fundamental Concepts

Commitment to TQM

- Commitment to TQM by the highest level of management
- Promotion of this concept to all levels and activities of the organization
- Individual involvement
- Devotion to continuous improvement

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Fundamental Concepts

Customer Satisfaction

- Internal customers
- External customers

- Customer needs
- Customer expectations

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Fundamental Concepts

Quality Losses

- Ineffective and inefficient utilization of human, financial and material resources in processes
- Loss of customer satisfaction
- Loss of opportunity to add more value
- Loss due to waste or misuse of resources

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Fundamental Concepts

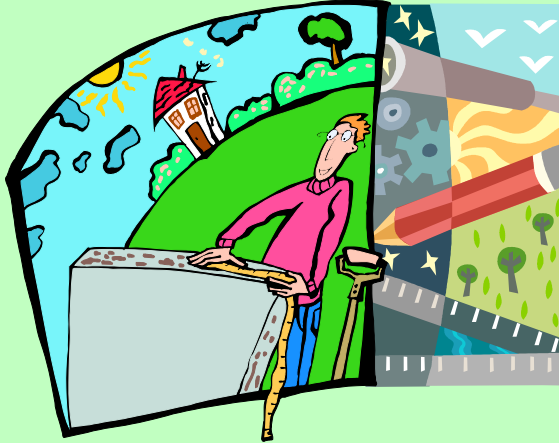
Participation by All

- Strengths and abilities of individuals
- Effective utilization of strengths and abilities
- Communication and teamwork

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Fundamental Concepts

Process Measurements



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Fundamental Concepts

Continuous Improvement



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Fundamental Concepts

Problem Identification



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Fundamental Concepts

Alignment of Corporate Objectives and Individual Attitudes

- Appraisal and development of human resource
- Quality improvement goals
 - Clear, understandable, specific, measurable, achievable, realistic, time-bound and agreed to by all relevant individuals.
 - Focused on customer satisfaction
 - In line with overall business goals and mission

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Fundamental Concepts

Personal Accountability

Personal Development

- Responsibilities and authorities for all individuals
- Job descriptions
- Appraisal, training and development of individuals at all levels

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Implementing Total Quality Management

- Appropriate systems, improvement tools and techniques
- Application and coordination of the above
- Overcome resistance to change

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Implementing TQM

Organizational Structure

- Incremental improvement of processes
- Review of the appropriateness of the organizational structure:
 - Laboratory management processes
 - Methods of resource allocation
 - Administrative support processes
 - Human environment
 - Training for all laboratory members
 - Laboratory processes and procedures

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Implementing TQM

Process Management Concept

- Process owner and process customer
- Responsibilities of management and process owners:
 - Purpose of each process
 - Customers of each process
 - Needs and expectations of customers
 - Needs and expectations of the process owners
 - Performance standards of processes
 - Measurement of process performance
 - Improvement opportunities

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Implementing TQM

Measurement of Performance

- Monitoring the performance of all key functions and processes
- Key attributes:
cost, time, flexibility, and quality
- Indicators of process efficiency
labour, capital and material utilization, scrap, screening, re-adjustment, waiting time, lost time, impracticable tolerances, excessive stock etc.
- Measures of customer satisfaction
Customer surveys, surveys of competing products, routine inspections, customer complaints etc.

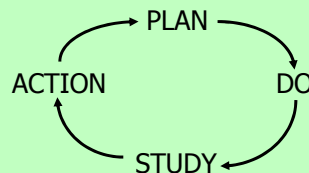
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Implementing TQM

Improvement Planning Techniques

- Planning quality improvement
- Implementing the plan
- Analyzing the results
- Re-planning

- Inter-related improvement plans
- Involvement of staff



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Implementing TQM Training

- Why training
 - To perform individual process
 - To be aware of the relationship with other processes
 - To understand the significance of our role and the part we play in customer satisfaction and business objectives
 - To contribute to the continual improvement programs

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Implementing TQM Training

- Environment for quality improvement
- Training to all laboratory personnel
 - Quality principles and practices
 - Quality improvement methods
- Subjects for training
 - Management, technical, process, problem solving tools, communication, skills, organization, awareness etc

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Quality Improvement

- Situations requiring improvement
 - High quality costs
 - Customer complaints
 - Health and safety considerations
- Problem solving techniques
 - Identify opportunities for improvement
 - Apply to all areas of the business
- Review priorities of improvement before action

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Quality Improvement

A Methodology for Quality Improvement

- Involve the whole organization
- Initiate quality improvement projects or activities
- Investigate possible areas for improvement
- Establish cause and effect relationship
- Take improvement action
- Confirm the improvement
- Sustain the gains

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Quality Improvement Improvement Process

- Identify
- Evaluate
- Plan
- Execute
- Check
- Amend

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Quality Improvement Problem Solving Process

- Identify subjects for improvement
- Prioritize
- Analyze causes of problem
- Collect data for analysis
- Assess alternative solutions for actions
- Select the optimum solution for action

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Quality Improvement Problem Solving Process

- Identifying the problem
- Describing the problem
- Analyzing the problem
- Planning the solutions
- Implementing the solutions
- Monitoring/evaluating the solutions

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Managing for Quality Improvement Organizing for Quality Improvement



- Responsibilities for quality improvement
 - Within the organizational hierarchy
 - Management processes
 - Work processes
 - Measurement of the reduction of quality losses
 - Administrative support processes
 - Building of an environment for quality improvement
 - Within the processes that flow across organizational boundaries

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Managing for Quality Improvement

Organizing for Quality Improvement

- Responsibilities for quality improvement
 - Within the organizational hierarchy
 - Within the processes that flow across organizational boundaries
 - Definition of the purpose of each process
 - Communication among departments
 - Identification of internal and external customers
 - Determination of their needs and expectations
 - Searching process improvement opportunities

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Managing for Quality Improvement

Planning for Quality Improvement

- Set quality improvement goals
- Address the most important quality losses
- Involvement of everyone
- Inputs from all, from reviews, from suppliers from customers
- Focus on newly identified opportunities and where there is insufficient progress
- Implement quality improvement plans

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Managing for Quality Improvement

Measuring Quality Improvement

- Measure of quality losses
 - Associated with customer satisfaction
 - Surveys of current and potential customers
 - Surveys of competing products and services
 - Changes in revenues
 - Inspections
 - Customer complaints
 - Associated with process efficiency
 - Sustained by society

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Managing for Quality Improvement

Measuring Quality Improvement

- Measure of quality losses
 - Associated with customer satisfaction
 - Associated with process efficiency
 - Labour, capital and material utilization
 - Unsatisfactory process output
 - Waiting times
 - Delivery performance
 - Size of inventories
 - Sustained by society

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Managing for Quality Improvement

Measuring Quality Improvement

- Measure of quality losses
 - Associated with customer satisfaction
 - Associated with process efficiency
 - Sustained by society
 - Failure to realize human potential (surveys of employee satisfaction)
 - Damage caused by pollution and disposal of waste and depletion of scarce resources

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Managing for Quality Improvement

Measuring Quality Improvement

- Statistical interpretation of trends
- Establish and meet numerical targets
- Measure and track trends
- Report and review measures
- Measure the cost of measurement

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Tools for Quality Improvement

Data Collection Form



- Establish the specific purpose of collecting this data
- Identify categories of information
- Find factors that affect these categories
- Determine how data will be analysed
- Multivote to reduce both lists
- Construct a tabular form
- Provide a place for information about the origination of the data

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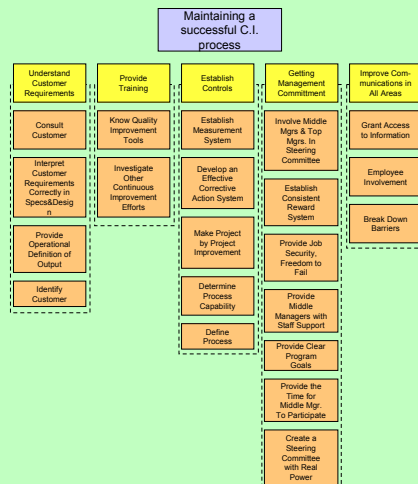
Tools for Quality Improvement

(Non-numerical data)

Affinity Diagram



- Start the issue in broad terms
- Record individual response in small cards
- Mix the cards and spread them randomly on a large table
- Group related cards together
- Transfer the information onto paper outlined by grouping



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Tools for Quality Improvement

(Non-numerical data)



Benchmarking

- Determine what items to benchmark
- Determine who to benchmark
(companies, organizations, competitors, etc.)
- Determine benchmark
(collect data, surveys, interviews etc.)
- Determine the best-in-class for each benchmark item

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Tools for Quality Improvement

(Non-numerical data)



Brainstorming

- The steps
 - Generation phase
 - Clarification phase
 - Evaluation phase
- The rules
 - State the purpose
 - Urge people to express ideas
 - Offer one thought at a time
 - Do not criticize ideas
 - Do not discuss ideas
 - Built on other's ideas
 - Record all ideas

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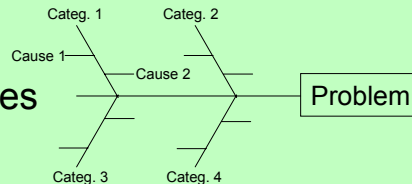
Tools for Quality Improvement

(Non-numerical data)



Cause and Effect Diagram

- Define the problem (effect)
- Define the major categories of causes (materials, machines, methods, people, training, measurements etc.)
- Construct the diagram
- Brainstorm possible causes
- Analyse each cause
- Identify the root causes
- Gather data to verify the root causes



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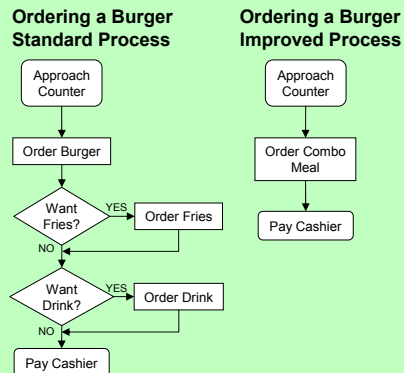
Tools for Quality Improvement

(Non-numerical data)



Flowchart

- List the input to the process or activity
 - who supplies and who receives and what is done with this input
- List the outputs from each process or activity
 - who receives this output and what happens next
- Built the chart using the appropriate symbols and connect all processes
- Review the chart (correct duplication of processes, rework loops etc.)



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Tools for Quality Improvement

(Non-numerical data)

Tree Diagram



- State the core issue problem or goal
- Define major subcategories of the core
- Construct the diagram
- For each subcategory define the component elements and sub-elements
- Review the diagram to ensure that there are no obvious gaps in sequence or logic

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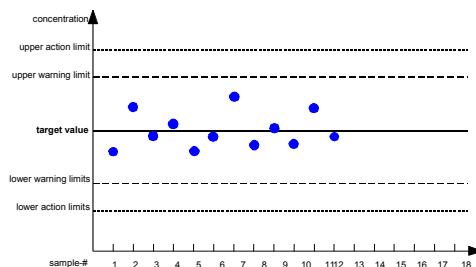
Tools for Quality Improvement

(Numerical data)

Control Charts



- Select the control chart type
- Record measurement data on the Y-axis
- Plot the groups of data (e.g. by date) on the X-axis
- Calculate the average and control limits
- Mark points of \bar{x} and control limits on the Y-axis
- Plot observations



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Tools for Quality Improvement

(Numerical data)

Histogram



- Collect data
- Arrange in ascending order
- Determine the range of the data
- Determine the width of each class interval (column)
- Put class interval in the X-axis
- Put frequency scale on the Y-axis
- Draw the height of each column



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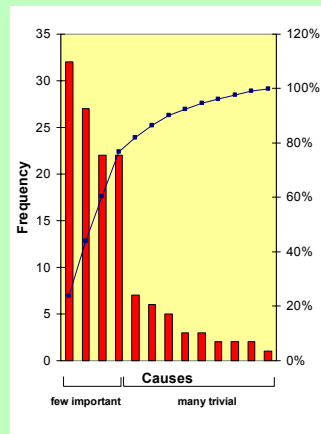
Tools for Quality Improvement

(Numerical data)

Pareto Diagram



- Select the items to be analyzed
- Select the unit of measure for analysis
- Select the time period to be analyzed
- List the items in the order of decreasing magnitude
- Construct two vertical axes. The left scale should present the units of measures and the right one should be from 0% to 100%
- Draw a rectangle above each item
- Construct the the cumulative frequency line
- Identify the most important items



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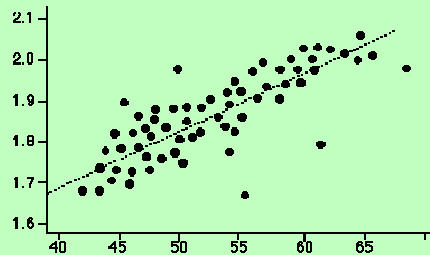
Tools for Quality Improvement

(Numerical data)

Scatter Diagram



- Collect paired data
- Graduate x and y axes
- Plot the data
- Label the axes
- Examine the pattern



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Quality Gurus



- Philip B. Crosby
- William E. Deming
- Joseph M. Juran
- Armand V. Feigenbaum
- Kauro Ishikawa
- Tom J. Peters

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Quality Gurus

Philip B. Crosby



The four absolutes of Quality Management

1. Quality equals conformance to requirement
2. Prevention causes quality
3. Zero defects
4. The measurement of quality is the price of non-conformance

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Quality Gurus

Crosby's 14 Steps for Quality Improvement



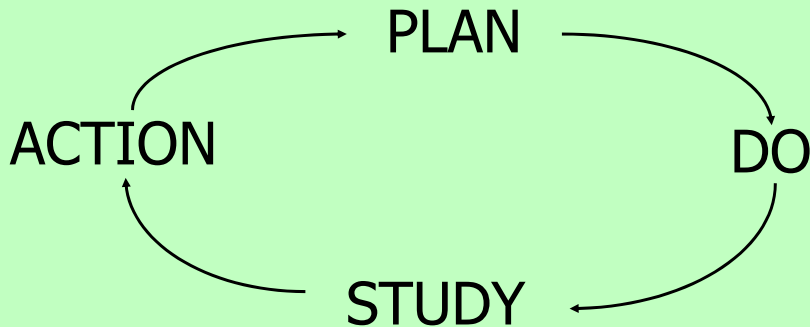
1. Management Commitment
2. Quality Improvement Team
3. Measurement
4. Cost of Quality
5. Quality Awareness
6. Corrective Action
7. Zero defects Planning
8. Employee education
9. Zero defects day
10. Goal Setting
11. Error cause removal
12. Recognition
13. Quality Councils
14. Do it all over again

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Quality Gurus

William E. Deming



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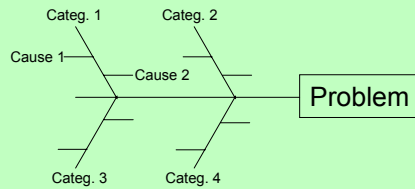
Quality Gurus

William Deming's 14 Points

1. Constancy of purpose
2. The new philosophy
3. Cease dependence upon inspection
4. End "Lower tender" contracts
5. Improve every process
6. Institute training on the job
7. Institute leadership
8. Drive out fear
9. Breakdown barriers
10. Eliminate exhortation
11. Eliminate targets
12. Permit pride of workmanship
13. Encourage education
14. Top management commitment

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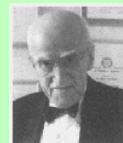
Quality Gurus Kauro Ishikawa



- Involvement of all employees in decision making
- Quality Circles
- Extensive use of statistics and Quality Control

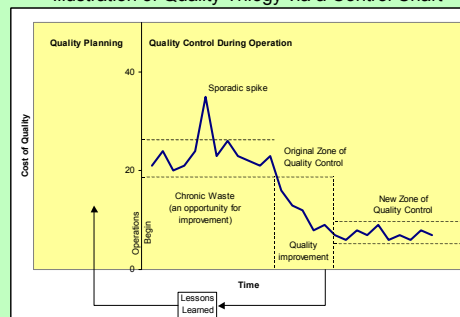
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Quality Gurus Joseph M. Juran



- Quality Planning
- Quality Improvement
- Quality Control

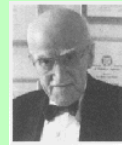
Illustration of Quality Trilogy via a Control Chart



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Quality Gurus

Joseph M. Juran



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Cost of Quality

- Measurement of the effect of quality
- Management of processes
- Involvement of all individuals to the processes
- Process owner
- Cost of conformance
- Cost of non conformance

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Cost of Quality

- Costs of control
 - prevention costs
 - The cost of training people, organizing business etc.
 - appraisal costs
 - Quality control (analyzing, testing, measuring etc.)

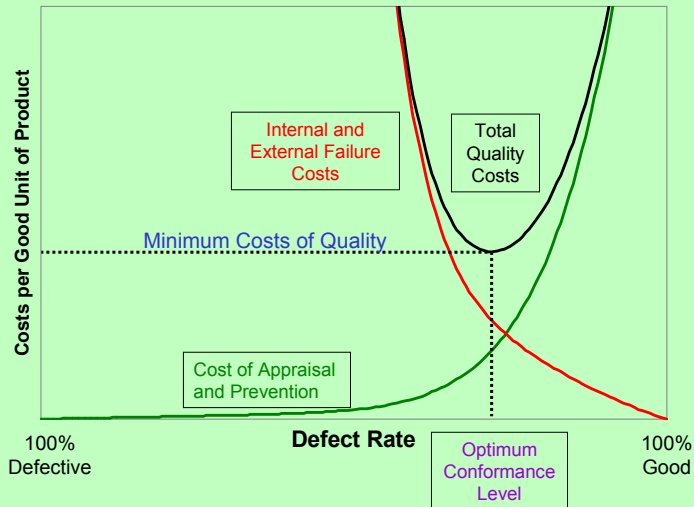
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Cost of Quality

- Costs of failure of control
 - internal defect costs
 - Waste, scrap, rework
 - Poor design, poor R&D, poor manufacturing work
 - external defect costs
 - Loss of customers, loss of good will, loss of sales
 - Lost opportunity cost

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Minimizing the Costs of Quality



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Cost of Quality

The Seven Sources of Waste

- Overproduction
- Defective products
- Waiting lines and delays
- Stocks of intermediaries/semi-finished products
- Transportation
- Ineffective procedures
- Ineffective movements or actions

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Cost of Quality

The Seven Sources of Wastes

- Overproduction



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Cost of Quality

The Seven Sources of Wastes

- Defective products



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Cost of Quality

The Seven Sources of Wastes

- Waiting lines and delays



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Cost of Quality

The Seven Sources of Wastes

- Stocks of intermediary/semi-finished products



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Cost of Quality

The Seven Sources of Wastes

- Transportation



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Cost of Quality

The Seven Sources of Wastes

- Ineffective procedures

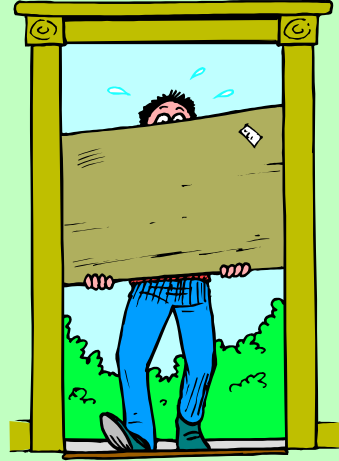


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Cost of Quality

The Seven Sources of Wastes

- Ineffective movements or actions



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Summary

- Applied philosophy
- Management commitment
- Achievement of excellence
- Management of change
- Continual improvement
- Opportunities for improvement
- Tools for improvement

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Where to Get More Information

- <http://www.philipcrosby.com>
- <http://www.isixsigma.com>
- <http://www.deming.org/>
- <http://www.juran.com/>
- BS 7850-1:1992 Total Quality Management, Part 1: Guide to management principles
- BS 7850-2:1994 Total Quality Management, Part 2: Guide to quality improvement methods
- BS 6143-1:1992 Guide to the economics of Quality. Part 1: Process cost model
- BS 6143-2:1990 Guide to the economics of Quality. Part 1: Prevention, appraisal and failure model

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