

## CHAPTER SIX

# Managing Quality

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## Where We Are Now

Chapter	Relationships	Sustainability	Globalization	Organizational Culture/Ethics	Change Management	Measurement
<b>Part 1 Supply Chain: A perspective for Operations Management</b>						
1. Introduction to Managing Operations Across the Supply Chain	X	X	X			
2. Operations and Supply Chain Strategy	X	X	X	X	X	X
<b>Part 2 Foundations of Operations Management</b>						
3. Managing Processes and Capabilities	X					X
4. Product/Process Innovation	X	X	X		X	
5. Manufacturing and Service Process Structures	X		X	X		X
<b>6. Managing Quality</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
7. Understanding Inventory Fundamentals	X	X				X
8. Lean Systems	X		X	X	X	X
<b>Part 3 Integrating Relationships Across the Supply Chain</b>						
9. Customer Management	X					X
10. Supplier Management	X	X	X	X		X
11. Logistics Management	X	X	X			
<b>Part 4 Planning of integrated Operations Across the Supply chain</b>						
12. Demand Planning: Forecasting and Demand Management	X		X			X
13. Sales and Operations Planning	X		X			X
14. Independent Demand Inventory Planning	X					X
15. Materials and Resource Requirements Planning	X		X			X
<b>Part 5 Managing Change in Supply Chain Operations</b>						
16. Project Management	X	X	X	X	X	X
17. Evolving Business Models and Change Drivers in the Supply Chain	X	X	X	X	X	

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## Learning Objectives

1. Explain *product quality* and *quality management*
2. Explain roles of various business functions in determining product quality
3. Describe core values and practices
4. Perform cost analysis
5. Compare and contrast various quality standards and certification programs
6. Apply 6 Sigma and DMAIC

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## Dimensions of Quality

- ***Product Quality***: fitness for consumption in meeting customers needs and desires
- ***Design Quality***: match between designed features and customer requirements
- ***Conformance Quality***: meeting design specifications
- ***Quality Management***: organization wide quality focus

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## Dimensions of Quality for Goods and Services

Dimensions of Product Quality	Description for <i>Tangible Good</i>	Description for <i>Intangible Service</i>
Performance	Degree to which meets or exceeds certain operating characteristics	
Features	Presence of unique characteristics supplementing basic features	
Reliability	Operating time before repair	Dependable & accurate
Durability	Product life or amount of use on gets until deterioration	
Conformance	Degree to which design specifications are met	
Aesthetics	Look, feel, sound, taste or smell	Facilities, equipment, personnel and communication materials
Support/ Responsiveness	Installation, information, maintenance or repair	Willingness to help and prompt service
Perceived Quality (Reputation/Assurance/ Empathy)	Image, advertising, brand name, reputation, etc. not directly associated with attributes	Knowledge & courtesy of employees; ability to convey trust, confidence, caring and individual attention

Figure 6-1 6-5

## Functional Influence on Product Quality

Functional Personnel	Decisions and Activities Impacting Quality
Marketing	Market selection Advertising New product testing
Sales	Set sales targets Interact with customers Interpret customers' needs and desires
Product Engineers	Design specifications, service elements, tolerances, etc. Design prototype
Process Engineers	Design processes Choices of technology, capabilities and capacity Quality assurances tests and procedures
Finance & Accounting	Monitor equipment purchases Utilization goals Measures of efficiency and productivity

Figure 6-2 6-6

## Functional Influence on Product Quality cont'd

### Functional Personnel Decisions and Activities Impacting Quality

Human Resources	Hiring criteria; training and development programs Compensation schemes and incentives
Manufacturing & Service Operations	Design and execute processing procedures Design work policies Manage facilities and equipment Schedule work
Supply Managers	Purchase requirements Supplier selection Manage contracts Manage suppliers
Logistics Managers	Selection of transportation providers Develop tracking systems Design packaging, storage and material handling processes Management of transportation providers

Figure 6-2

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## Cost of Quality (COQ)

<b>Prevention Costs</b>	Costs associated with <u>preventing defects</u> and limiting failure and appraisal costs (e.g., training, improvement projects, data gathering, analysis)
<b>Appraisal Costs</b>	Costs associated with inspection to assess quality levels (e.g. staff, tools, training, etc.)
<b>Internal Failure Costs</b>	Costs from defects found <u>before</u> delivery to the customer (e.g., rework, scrap, etc.)
<b>External Failure Costs</b>	Costs associated with defects found <u>after</u> delivery to customer (e.g., warranty, recall, etc.)

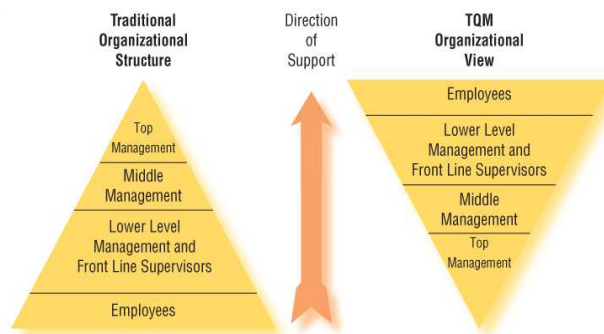
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## Quality Thought Leaders

- Deming** Holistic view of responsibility for quality  
 Variability as source of most problems  
 Importance of customer
- Juran** Broadened definition of quality  
 Focus on change management  
 cost of quality analysis
- Crosby** Quality is free  
 Zero defects  
 Focus on incremental change
- Imai** Kaizen system of continuous improvement  
 Intense process-oriented view  
 Heavy dependence on frontline worker insights  
 Emphasis on worker training and development

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## Inverted View of Management

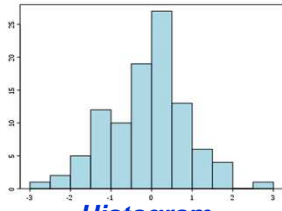


**FIGURE 6-1**  
 Traditional versus Quality Management View of Organizational Structure

Figure 6-1

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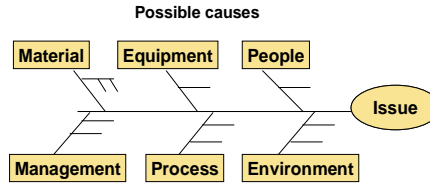
# Quality Improvement Tools



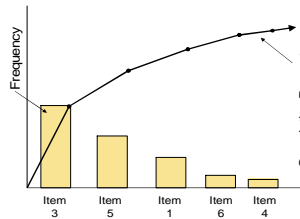
**Histogram**  
uncover patterns in data

Defects in Jeans		
Defect type	Tally	Total
A. Tears in fabric	////	4
B. Discolored fabric	///	3
C. Broken zipper	/// // // //	36
D. Ragged seams	/// //	7
	<b>Total</b>	<b>50</b>

**Check Sheets**  
frequency and location of problems



**Cause and Effect Analysis**  
uncover contributors to a problem



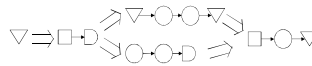
**Pareto Analysis**  
Identify critical (frequent) problems

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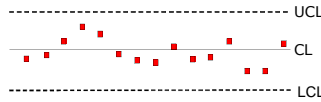
# Quality Improvement Tools cont'd



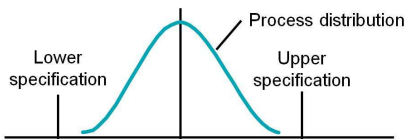
**Scatter Diagrams**  
determine variable relationships



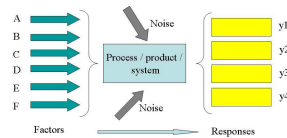
**Process Flow Analysis**  
display and analyze process steps



**Process Control Chart**  
monitor if operating normally



**Process Capability Analysis**  
compare specifications to variability



**Taguchi**  
understand effects of process on output

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## TQM Values and Success Factors

- TQM values

- Holistic view of quality
- Emphasis on customer
- Extended process view of operations
- Emphasis on prevention, not inspection
- Disdain for variability
- Data (not opinion) based decision making
- Employee empowerment
- Top Management support
- Supplier involvement
- Continuous improvement

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## TQM Values and Success Factors cont'd

- TQM success factors

- Strong, charismatic leadership
- Trust between labor and management
- Motivation for change
- Adequate resources
- Management of change process
- Unquestionable success of early efforts

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## Guiding Methodologies: PDCA

• **Plan-do-check-act cycle** (Deming wheel or cycle): sequence to solve problems and improve over time

- **Plan**: identify problem and actions for improvement
- **Do**: implement formulated plan
- **Check**: monitor results
- **Act**: take corrective action and institutionalize changes

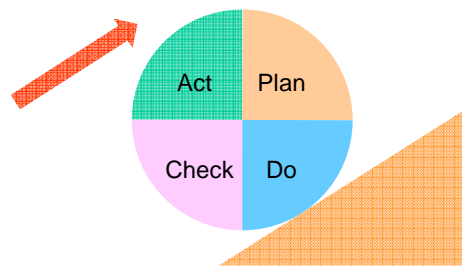


Figure 6-2

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## Guiding Methodologies: 6 $\sigma$

**Six Sigma**: quality improvement through elimination of defects and variation

**Standard deviation**: statistical measure of variation

Sigma Level	Defects per Million
2 $\sigma$	308,537
3 $\sigma$	66,807
4 $\sigma$	6,210
5 $\sigma$	233
6 $\sigma$	3.4

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## ISO 9000

**ISO 9000:** internationally accepted standards for quality management systems

What an organization does to fulfill:

- the customer's quality requirements, and
- applicable regulatory requirements, while aiming to
- enhance customer satisfaction, and
- achieve continual improvement of its performance in pursuit of these objectives.

<http://www.iso.org>

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## Malcolm Baldrige Quality Award

US national quality award for organizations judged to possess outstanding quality and performance excellence in seven areas:

1. Leadership
2. Strategic planning
3. Customer and market focus
4. Measurement, analysis, and knowledge management
5. Workforce focus
6. Process management
7. Results

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## ISO 9000 and MBNQA

### ISO 9000

- For all types of organizations
- Application and audit
- International standard
- Required by many customers
- Certification maintenance requires periodic auditing

### MBNQA

- For all types of organizations
- Application and audit
- Helps with improvement
- Facilities sharing 'best practices'
- Working tool for understanding, measuring and improving performance
- Provides opportunity to compare quality systems

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## Managing Quality Summary

1. Innovative firms gain competitive advantage.
2. Innovation in the SC involves customers, suppliers and other partners, resulting in faster and more efficient development.
3. Innovation projects have multiple stages.
4. Innovation project stages can proceed sequentially or concurrently.
5. Innovation projects require the integration of many interrelated product/process design issues

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