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Process Analysis

Chapter 5

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How Process Analysis fits the Operations Management Philosophy

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Process Analysis

➤ **Process analysis** is the documentation and detailed understanding of how work is performed and how it can be redesigned.

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A Systematic Approach to Process Analysis

- **Suggestion system:** a voluntary system by which employees submit their ideas on process improvements.
- **Design team:** A group of knowledgeable, team-oriented individuals who work at one or more steps in the process, do the process analysis and make the necessary changes.
- **Metrics:** Performance measures that are established for a process and the steps within it.
- **Flowcharts:** A diagram that traces the flow of information, customers, equipment, or materials through the various steps of a process.
 - **Service Blueprint:** A special flowchart of a service process that shows which steps have high customer contact (line of visibility).

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Flowchart for the Sales Process of a Consulting Company

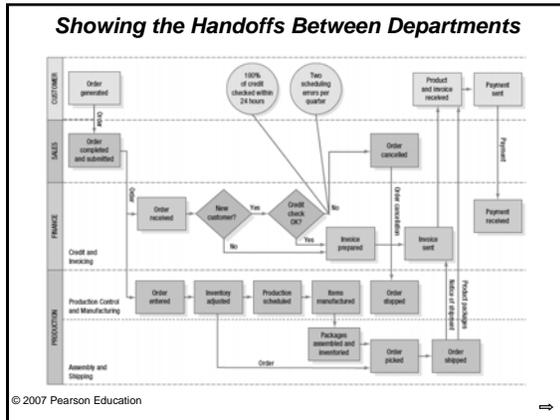
Service Blueprint

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Flowchart of a Nested Subprocess

Client Agreement & Service Delivery Step

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Process Charts

- **Process chart:** An organized way of documenting the activities performed by a person or group of people at a work station, with a customer, or on materials.
- Five categories of process charts:
 1. Operations that change, create or add something.
 2. Transportation (materials handling): Moving something.
 3. Inspection: Checking or verifying something.
 4. Delays: Time spent awaiting further action.
 5. Storage: When something is put away until a later time.

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Process Chart for an Emergency Room Admission

Summary			
Activity	Number of steps	Time (min)	Distance (ft)
Operation	5	23	—
Transport	9	11	815
Inspect	2	8	—
Delay	3	8	—
Store	—	—	—

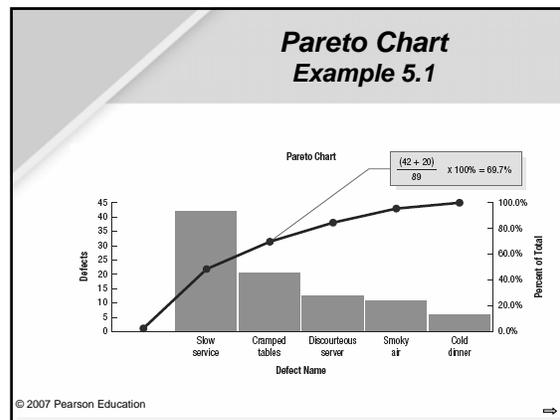
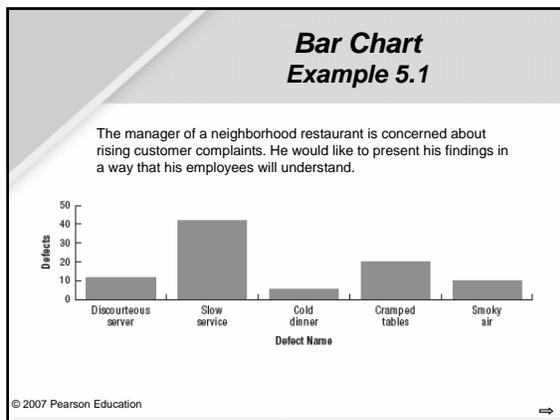
Step description			
Step no.	Time (min)	Distance (ft)	Activity
1	0.50	15	Enter emergency room, approach patient window
2	15.0	-	Sit down and fill out patient history
3	0.75	40	Nurse escorts patient to ER triage room
4	3.00	-	Nurse inspects injury
5	0.75	40	Nurse takes patient to radiology
6	1.00	-	Wait for available bed
7	1.00	60	Go to ER bed
8	4.00	-	Wait for doctor
9	5.00	-	Doctor inspects injury and questions patient
10	2.00	200	Nurse takes patient to radiology
11	3.00	-	Technician x-rays patient
12	2.00	200	Return to bed in ER
13	3.00	-	Wait for doctor to return
14	2.00	-	Doctor provides diagnosis and advice
15	1.00	60	Return to emergency entrance area
16	4.00	-	Check out
17	2.00	180	Walk to pharmacy
18	4.00	-	Pick up prescription
19	1.00	20	Leave the building

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Evaluating Performance

- **Checklist:** A form used to record the frequency of occurrence of certain service or product characteristics related to performance.
- **Histogram:** A summarization of data measured on a continuous scale, showing the frequency distribution of some quality characteristic (the central tendency and dispersion of the data).
- **Bar chart:** A series of bars representing the frequency of occurrence of data characteristics measured on a yes-or-no basis.
- **Pareto Chart:** A bar chart on which factors are plotted in decreasing order of frequency along the horizontal axis.

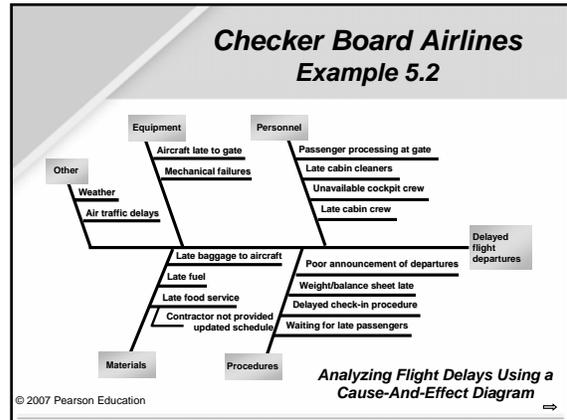
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More Tools for Evaluating Performance

- **Scatter-diagram:** A plot of two variables showing whether they are related.
- **Cause-and-effect diagram:** A diagram that relates a key performance problem to its potential causes.
 - Sometimes called the **fishbone diagram**.
- **Graphs:** Representation of data in a variety of pictorial forms, such as line charts and pie charts.

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Wellington Fiber Board Co. Example 5.3

The Wellington Fiber Board Company produces headliners, the fiberglass components that form the inner roof of passenger cars. Management wants to identify which defects were most prevalent and to find the cause.

They decide to use the following tools:

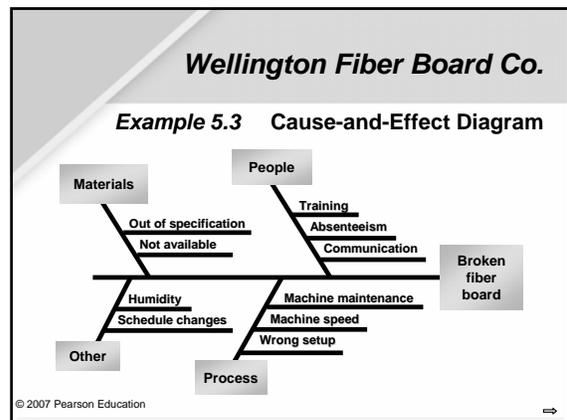
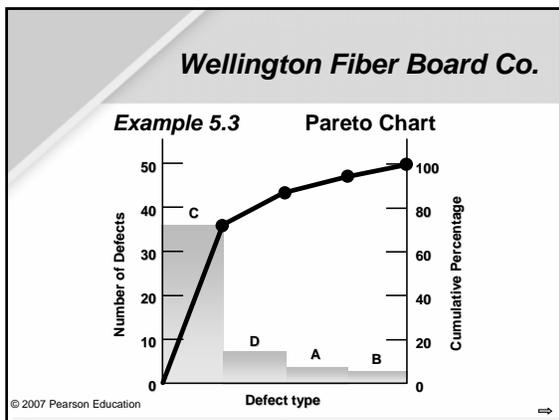
- Step 1. Checklist
- Step 2. Pareto chart
- Step 3. Cause-and-effect diagram
- Step 4. Bar chart

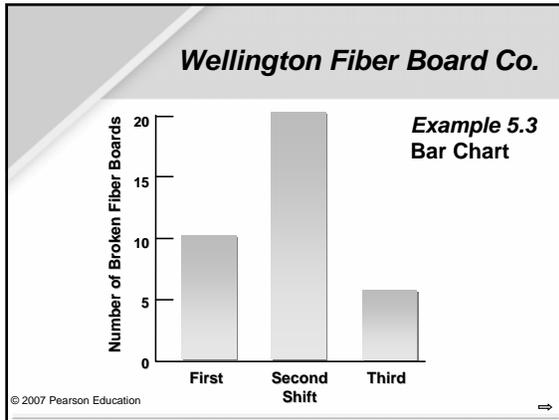
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Wellington Fiber Board Co. Example 5.3 Checklist

Headliner Defects		
Defect type	Tally	Total
A. Tears in fabric	////	4
B. Discolored fabric	///	3
C. Broken fiber board	/// <i>II</i> <i>II</i> <i>II</i> <i>II</i>	36
D. Ragged edges	/// <i>II</i>	7
	Total	50

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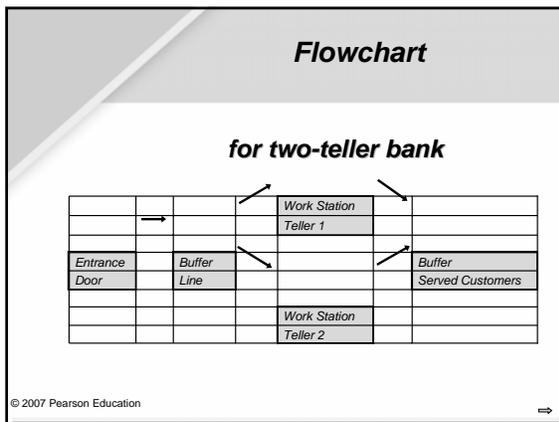
Process Simulation

- **Process simulation** is the act of reproducing the behavior of a process using a model that describes each step.
 - It shows how a process dynamically changes over time.
- Using SimQuick, the first step is to draw a **flowchart** of the process using SimQuick's building blocks.

Flowchart for one-teller bank

Entrance	→	Buffer	→	Work Station	→	Buffer
Door		Line		Teller		Served Customers

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Bank Simulation Results

Element Types	Element Names	Statistics	Overall Means
Entrance(s)	Door	Service level	0.90
Buffer(s)	Line	Mean inventory	4.47
		Mean cycle time	11.04

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Redesigning the Process

- Ideas for process redesign and improvement can be uncovered by asking six questions about each step in the process and about the process as a whole.
 1. *What* is being done?
 2. *When* is it being done?
 3. *Who* is doing it?
 4. *Where* is it being done?
 5. *How* is it being done?
 6. *How well* does it do on the various metrics of importance?

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Redesigning the Process

- Answers to the previous six questions are challenged by asking still another set of questions.
 - *Why* is the process even being done?
 - *Why* is it being done where it is being done?
 - *Why* is it being done when it is being done?
- **Brainstorming** is letting a group of people, knowledgeable about the process, propose ideas for change by saying whatever comes to mind.

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Benchmarking

- **Benchmarking** is a systematic procedure that measures a firm's processes, services, and products against those of industry leaders.
 - Benchmarking focuses on setting quantitative goals for improvement.
- *Competitive benchmarking* is based on comparisons with a direct industry competitor.
- *Functional benchmarking* compares functional areas in the firm with those of outstanding firms in any industry.
- *Internal benchmarking* involves using an internal unit with superior performance as the benchmark for other units.

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Benchmarking Steps

- **Planning:** Identify the process, service or product to be benchmarked and the firm(s) to be used for comparison. Determine the performance metrics and collect the data.
- **Analysis:** Determine the gap between the firm's current performance and that of the benchmark firm(s).
- **Integration:** Establish goals and obtain the support of managers who must provide the resources for accomplishing the goals.
- **Action:** Develop cross-functional teams of those most affected by the changes, develop action plans, implement the plans and monitor progress.

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Illustrative Benchmarking Metrics by Type of Process

Customer Relationship Process
<ul style="list-style-type: none"> • Total cost of "enter, process, and track orders" per \$1,000 revenue • System costs of process per \$100,000 revenue • Value of sales order line item not fulfilled due to stockouts, as % of revenue • Percentage of finished goods sales value that is returned • Average time from sales order receipt until manufacturing or logistics is notified • Average time in direct contact with customer per sales order line item
Order Fulfillment Process
<ul style="list-style-type: none"> • Value of plant shipments per employee • Finished goods inventory turnover • Reject rate as percentage of total orders processed • Percentage of orders returned by customers due to quality problems • Standard customer lead time from order entry to shipment • Percentage of orders shipped on time

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Illustrative Benchmarking Metrics by Type of Process

New Service/Product Development Process
<ul style="list-style-type: none"> • Percentage of sales due to services/products launched last year • Cost of "generate new services/products" process per \$1,000 revenue • Ratio of projects entering the process to projects completing the process • Time to market for existing service/product improvement project • Time to market for new service/product project • Time to profitability for existing service/product improvement project
Supplier Relationship Process
<ul style="list-style-type: none"> • Cost of "select suppliers and develop/maintain contracts" process per \$1,000 revenue • Number of employees per \$1,000 of purchases • Percentage of purchase orders approved electronically • Average time to place a purchase order • Total number of active vendors per \$1,000 of purchases • Percentage of value of purchased material that is supplier certified

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Illustrative Benchmarking Metrics by Type of Process

Support Process
<ul style="list-style-type: none"> • Systems cost of finance function per \$1,000 revenue • Percentage of finance staff devoted to internal audit • Total cost of payroll processes per \$1,000 revenue • Number of accepted jobs as percentage of job offers • Total cost of "source, recruit, and select" process per \$1,000 revenue • Average employee turnover rate

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Process Management Mistakes

1. Not Connecting with Strategic Issues
2. Not Involving the Right People in the Right Way
3. Not Giving the Design Teams and Process Analysts a Clear Charter and Then Holding Them Accountable
4. Not Being Satisfied Unless Fundamental "Reengineering" Changes Are Made
5. Not Considering the Impact on People
6. Not Giving Attention to Implementation
7. Not Creating an Infrastructure for Continuous Process Improvement.

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