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Operations Management

Process Strategy

Chapter 7
Outline

- GLOBAL COMPANY PROFILE: DELL COMPUTER CO.
- FOUR PROCESS STRATEGIES
  - Process Focus
  - Repetitive Focus
  - Product Focus
  - Mass Customization Focus
  - Comparison of Process Choices
Outline - Continued

◆ PROCESS ANALYSIS AND DESIGN
  ◆ Flow Diagrams
  ◆ Time-Function Mapping
  ◆ Process Charts
  ◆ Service Blueprinting

◆ SERVICE PROCESS DESIGN
  ◆ Customer Interaction and Process Design
  ◆ More Opportunities to Improve Service Processes

◆ SELECTION OF EQUIPMENT AND TECHNOLOGY
Outline - Continued

◆ PRODUCTION TECHNOLOGY
  ◆ Machine Technology
  ◆ Process Control
  ◆ Vision Systems
  ◆ Automated Storage and Retrieval System
  ◆ Automated Guided Vehicle (AGV)
  ◆ Flexible Manufacturing Systems (FMS)
  ◆ Computer-Integrated Manufacturing (CIM)
Outline - Continued

♦ TECHNOLOGY IN SERVICES
♦ ENVIRONMENTALLY FRIENDLY PROCESSES
♦ PROCESS REENGINEERING
Learning Objectives

When you complete this chapter, you should be able to:

* Identify or Define:*
  - Process focus
  - Repetitive focus
  - Product focus
  - Process reengineering
  - Service process issues
  - Environmental issues
Learning Objectives - Continued

When you complete this chapter, you should be able to:

Describe or Explain:

- Process analysis
- Service design
- Green manufacturing
- Production technology
Dell Computer Company

“How can we make the process of buying a computer better?”

- Sell custom-build PCs directly to consumer
- Integrate the Web into every aspect of its business
- Operate with six days inventory
- Build computers rapidly, at low cost, and only when ordered
- Focus research on software designed to make installation and configuration of its PCs fast and simple
Fit of Process, Volume, and Variety

<table>
<thead>
<tr>
<th>Low-Volume (Intermittent)</th>
<th>Repetitive Process (Modular)</th>
<th>High-Volume (Continuous)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process focus</td>
<td>Mass Customization</td>
<td></td>
</tr>
<tr>
<td>projects, job shops, (machine, print, carpentry)</td>
<td>(difficult to achieve, but huge rewards)</td>
<td></td>
</tr>
<tr>
<td>Standard Register</td>
<td>Dell Computer Co.</td>
<td></td>
</tr>
<tr>
<td>Repetitive</td>
<td>Product focus</td>
<td></td>
</tr>
<tr>
<td>(autos, motorcycles)</td>
<td>(commercial baked goods, steel, glass)</td>
<td></td>
</tr>
<tr>
<td>Harley Davidson</td>
<td>Nucor Steel</td>
<td></td>
</tr>
</tbody>
</table>

High Variety
One or few units per run, high variety (allows customization)

Changes in modules
Modest runs, standardized modules

Changes in attributes
(such as grade, quality, size, thickness, etc.)
Long runs only

Mass Customization
(difficult to achieve, but huge rewards)

Dell Computer Co.
Production Process Flow Diagram

- **Customer**
  - Customer sales representative (take order)
  - Prepress Department (Prepare printing plates & negatives)
  - Printing Department
  - Collating Department
  - Gluing, binding, stapling, labeling
  - Polywrap Department
  - Shipping
  - Purchasing (order inks, paper, other supplies)
  - Vendors
  - Receiving
  - Warehousing (ink, paper, etc.)

- **Accounting**

**Information flow**

**Material flow**
Process Strategies

- Involve determining how to produce a product or provide a service

- Objective
  - Meet or exceed customer requirements
  - Meet cost & managerial goals

- Has long-run effects
  - Product & volume flexibility
  - Costs & quality
Types of Process Strategies

- Process strategies that follow a continuum
- Within a given facility, several strategies may be used
- These strategies are often classified as:

Process-Focused  Repetitive-Focused  Product-Focused

Continuum
Process-Focused Strategy

- Facilities are organized by process
- Similar processes are together
  - Example: All drill presses are together
- Low volume, high variety products
- ‘Jumbled’ flow
- Other names
  - Intermittent process
  - Job shop
Process Focus

Process-focused (intermittent process)

High variety of outputs

Many inputs
Process-Focused Strategy Examples

Machine Shop

Bank

Hospital

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Process Focused Strategy - Pros & Cons

- **Advantages**
  - Greater product flexibility
  - More general purpose equipment
  - Lower initial capital investment

- **Disadvantages**
  - High variable costs
  - More highly trained personnel
  - More difficult production planning & control
  - Low equipment utilization (5% to 25%)
Repetitive Focused Strategy

- Facilities often organized by assembly lines
- Characterized by *modules*
  - Parts & assemblies made previously
- Modules combined for many output options
- Other names
  - Assembly line
  - Production line
Repetitive Focus

Repetitive focus

Modules combined for many output options

Few modules

Raw material and module inputs
Repetitive Focused Strategy - Considerations

- More structured than process-focused, less structured than product focused
- Enables quasi-customization
- Using modules, it enjoys economic advantage of continuous process, and custom advantage of low-volume, high-variety model
Repetitive-Focused Strategy - Examples

Clothes Dryer

Truck

Fast Food

McDonald’s

over 95 billion served

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© 1995 Corel Corp.

© 1994 T/Maker Co.
Flow Diagram Showing the Production Process for Harley Davidson, York, PA.
Product-Focused Strategy

- Facilities are organized by product
- High volume, low variety products
- Where found
  - Discrete unit manufacturing
  - Continuous process manufacturing
- Other names
  - Line flow production
  - Continuous production

Operation

Products A & B

1 2 3
Product Focus

Product-focused (continuous process)

Output variations in size, shape, and packaging

Few inputs
Product-Focused Strategy
Pros & Cons

- **Advantages**
  - Lower variable cost per unit
  - Lower but more specialized labor skills
  - Easier production planning and control
  - Higher equipment utilization (70% to 90%)

- **Disadvantages**
  - Lower product flexibility
  - More specialized equipment
  - Usually higher capital investment
Product-Focused Examples

Soft Drinks (Continuous, then Discrete)

Light Bulbs (Discrete)

Paper (Continuous)

Soft Drinks (Continuous, then Discrete)

Light Bulbs (Discrete)

Mass Flu Shots (Discrete)
Flow Diagram Showing the Steelmaking Process at NUCOR
## A Comparison (1)

<table>
<thead>
<tr>
<th>Process Focus</th>
<th>Repetitive Focus</th>
<th>Product focus</th>
<th>Mass Customization</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Low volume, High variety)</td>
<td>(Modular)</td>
<td>(High-volume, low-variety)</td>
<td>(High-volume, high-variety)</td>
</tr>
<tr>
<td>1. Small quantity, large variety of products</td>
<td>Long runs, standardized product, from modules</td>
<td>Large quantity, small variety of products</td>
<td>Large quantity, large variety of products</td>
</tr>
<tr>
<td>2. General purpose equipment</td>
<td>Special equipment aids in use of assembly line</td>
<td>Special purpose equipment</td>
<td>Rapid changeover on flexible equipment</td>
</tr>
</tbody>
</table>
## A Comparison (2)

<table>
<thead>
<tr>
<th>Process Focus</th>
<th>Repetitive Focus</th>
<th>Product focus</th>
<th>Mass Customization</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Broadly skilled operators</td>
<td>Modestly trained employees</td>
<td>Operators less broadly skilled</td>
<td>Flexible operators trained for customization</td>
</tr>
<tr>
<td>4 Many instructions because of change in jobs</td>
<td>Reduced training and number of job instructions</td>
<td>Few work orders and job instructions</td>
<td>Custom orders require many instructions</td>
</tr>
<tr>
<td>5 Raw material high relative to product value</td>
<td>JIT techniques used</td>
<td>Raw material low relative to product value</td>
<td>Raw material low relative to product value</td>
</tr>
</tbody>
</table>
## A Comparison (3)

<table>
<thead>
<tr>
<th>Process Focus</th>
<th>Repetitive Focus</th>
<th>Product focus</th>
<th>Mass Customization</th>
</tr>
</thead>
<tbody>
<tr>
<td>6  WIP high relative to output</td>
<td>JIT techniques used</td>
<td>WIP low relative to output</td>
<td>WIP driven down by JIT, kanban, lean production</td>
</tr>
<tr>
<td>7 Units move slowly thru plant</td>
<td>Movement measured in hours &amp; days</td>
<td>Units move swiftly thru facility</td>
<td>Goods move swiftly thru facility</td>
</tr>
<tr>
<td>8 Finished goods made to order, not stored</td>
<td>Finished goods made to frequent forecasts</td>
<td>Finished goods made to forecast, then stored</td>
<td>Finished goods made to order</td>
</tr>
</tbody>
</table>
## A Comparison (4)

<table>
<thead>
<tr>
<th>Process Focus</th>
<th>Repetitive Focus</th>
<th>Product focus</th>
<th>Mass Customization</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 Scheduling complex and concerned with trade-off between inventory, capacity, and customer service</td>
<td>Scheduling based on building models from a variety of forecasts</td>
<td>Scheduling relatively simple, concerns establishing sufficient rate of output to meet forecasts</td>
<td>Scheduling sophisticated to accommodate customization</td>
</tr>
<tr>
<td>10 Fixed costs low, variable costs high</td>
<td>Fixed costs dependent on flexibility of facilities</td>
<td>Fixed costs high, variable costs low</td>
<td>Fixed costs high; variable costs must be low</td>
</tr>
</tbody>
</table>
### A Comparison (5)

<table>
<thead>
<tr>
<th>Process Focus</th>
<th>Repetitive Focus</th>
<th>Product focus</th>
<th>Mass Customization</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 Costing, done by job, is estimated prior to doing job but only known after doing job</td>
<td>Costs usually known based on experience</td>
<td>Because of high fixed costs, cost dependent on utilization of capacity</td>
<td>High fixed costs and dynamic variable costs</td>
</tr>
</tbody>
</table>
Process Continuum

Process Focused (intermittent process)

Repetitive Focus (assembly line)

Product Focused (continuous process)

High variety, low volume
Low utilization (5% - 25%)
General-purpose equipment

Modular Flexible equipment

Low variety, high volume
High utilization (70% - 90%)
Specialized equipment
Volume and Variety of Products

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>One or very few units per lot</td>
<td>Projects</td>
<td>Job Shops</td>
<td>Mass Customization</td>
</tr>
<tr>
<td>Very small runs, high variety</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modest runs, modest variety</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long runs, modest variations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very long runs, changes in attributes</td>
<td>Poor Strategy (High variable costs)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equipment utilization</td>
<td>5%-25%</td>
<td>20%-75%</td>
<td>70%-80%</td>
</tr>
</tbody>
</table>

Mass Customization
Mass Customization

- Using technology and imagination to rapidly mass-produce products that cater to sundry unique customer desires.
- Under mass customization the three process models become so flexible that distinctions between them blur, making variety and volume issues less significant.
## Mass Customization - More Choices Than even

<table>
<thead>
<tr>
<th>Item</th>
<th>Number of Choices</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Early 1970s</strong></td>
<td><strong>Early 21st Century</strong></td>
</tr>
<tr>
<td>Vehicle models</td>
<td>140</td>
</tr>
<tr>
<td>Vehicle styles</td>
<td>18</td>
</tr>
<tr>
<td>Bicycle types</td>
<td>8</td>
</tr>
<tr>
<td>Software titles</td>
<td>0</td>
</tr>
<tr>
<td>Web sites</td>
<td>0</td>
</tr>
<tr>
<td>Movie releases</td>
<td>267</td>
</tr>
<tr>
<td>New book titles</td>
<td>40,530</td>
</tr>
<tr>
<td>Houston TV channels</td>
<td>5</td>
</tr>
<tr>
<td>Breakfast cereals</td>
<td>160</td>
</tr>
<tr>
<td>Item SKUs in supermarkets</td>
<td>14,000</td>
</tr>
</tbody>
</table>
Process Strategies

**Repetitive Focus**
- Modular design
- Flexible equipment

**Mass Customization**

**Effective scheduling techniques**

**Process-focused**
- High variety, low volume
- Low utilization (5% - 20%)
- General purpose equipment

**Product-focused**
- Low variety, high volume
- High utilization (70% - 80%)
- Specialized equipment

**Rapid throughput techniques**
Questions for Process Analysis and Design

- Is the process designed to achieve competitive advantage in terms of differentiation, response, or low cost?
- Does the process eliminate steps that do not add value?
- Does the process maximize customer value as perceived by the customer?
- Will the process win orders?
Crossover Charts

Fixed cost

Variable cost

Process A

Process B

Process C

Volume

V₁(2,857) V₂(6,666)

Fixed cost - Process A

Fixed cost - Process B

Fixed cost - Process C

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Tools for Process Design

- Flow Diagrams
- Process Charts
- Time-Function/Process Mapping
- Work Flow Analysis
Production Process Flow Diagram

Customer

Customer sales representative take order

Prepress Department (Prepare printing plates and negatives)

Printing Department

Collating Department

Gluing, binding, stapling, labeling

Polywrap Department

Shipping

Accounting

Purchasing (order inks, paper, other supplies)

Vendors

Receiving

Warehousing (ink, paper, etc.)

Information flow

Material flow
Time Function Map
(Target)

Customer
Order Product

Sales
Process Order

Production control
Wait

Plant
Order
Print
WIP
Extrude

Warehouse

Transport

1 day 2 days 6 days 1 day 1 day 1 day

Receive product

Move

PowerPoint presentation to accompany Heizer/Render – Principles of Operations Management, 5e, and Operations Management, 7e
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7-43
SUBJECT: Request tool purchase

<table>
<thead>
<tr>
<th>Dist (ft)</th>
<th>Time (min)</th>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>•leftrightarrow □ D ▽</td>
<td>Write order</td>
</tr>
<tr>
<td></td>
<td></td>
<td>○leftrightarrow □ D ▽</td>
<td>On desk</td>
</tr>
<tr>
<td>75</td>
<td></td>
<td>○ ▽ □ D ▽</td>
<td>To buyer</td>
</tr>
<tr>
<td></td>
<td></td>
<td>○leftrightarrow □ D ▽</td>
<td>Examine</td>
</tr>
</tbody>
</table>

○ = Operation;leftrightarrow = Transport;□ = Inspect;
D = Delay; ▽ = Storage
### Process Chart - Hamburger Assembly

<table>
<thead>
<tr>
<th>Dist. (Ft)</th>
<th>Time (Mins)</th>
<th>Chart Symbols</th>
<th>Process Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.05</td>
<td>○⇒□ ▼</td>
<td>Meat Patty in Storage</td>
</tr>
<tr>
<td>1.5</td>
<td>.20</td>
<td>○⇒□ ▼</td>
<td>Transfer to Broiler</td>
</tr>
<tr>
<td>2.50</td>
<td></td>
<td>○⇒□ ▼</td>
<td>Broiler</td>
</tr>
<tr>
<td>.05</td>
<td></td>
<td>○⇒□ ▼</td>
<td>Visual Inspection</td>
</tr>
<tr>
<td>1.0</td>
<td>.15</td>
<td>○⇒□ ▼</td>
<td>Transfer to Rack</td>
</tr>
<tr>
<td>.15</td>
<td></td>
<td>○⇒□ ▼</td>
<td>Temporary Storage</td>
</tr>
<tr>
<td>.5</td>
<td>.05</td>
<td>○⇒□ ▼</td>
<td>Obtain Buns, Lettuce, etc.</td>
</tr>
<tr>
<td>.20</td>
<td></td>
<td>○⇒□ ▼</td>
<td>Assemble Order</td>
</tr>
<tr>
<td>.5</td>
<td>.10</td>
<td>○⇒□ ▼</td>
<td>Place in Finish Rack</td>
</tr>
<tr>
<td>3.5</td>
<td>3.15</td>
<td>2 4 1 - 2</td>
<td>TOTALS</td>
</tr>
</tbody>
</table>

Value-added time = Operation time/Total time = (2.50+.20)/3.15=85.7%
Service Blueprint for Service at Ten Minute Lube, Inc.

**Level #1**
Customer arrives for service
- **F:** Poka-Yokes to address potential failure points

**Level #2**
Customer may interact with service provider
- **F:** Warm greeting and obtain service request
- **No**
- **Standard request**
  - **F:** Determine specifics
  - **Can service be done and does customer approve?**
    - **No**
    - **Notify customer and recommend an alternative provider**
    - **F**
    - **F**
  - **Yes**
    - **Direct customer to waiting room**
    - **F**
    - **F**

**Level #3**
Service is removed from customer’s control and interaction
- **Yes**
  - **Perform required work**
    - **F**
    - **Prepare invoice**
    - **F**
  - **No**
  - **Notify customer that car is ready**
    - **F**

**Personal Greeting**
- **F:** Bell in driveway in case customer arrival was unnoticed.
- **F:** If customer remains in the work area, offer coffee and reading material in waiting room.

**Service Diagnosis**
- **Poka-Yoke:** Conduct dialog with customer to identify customer expectation and assure customer acceptance.

**Perform Service**
- **Poka-Yoke:** Review checklist for compliance.
- **Poka-Yoke:** Service personnel reviews invoice for accuracy.

**Friendly Close**
- **Poka-Yoke:** Customer approves invoice.
- **Poka-Yoke:** Customer inspects car.
- **Customer departs**
- **Customer pays bills**
- **Notify customer that car is ready**
- **F**
Work Flow Analysis - Four Phases

- **Request** from a customer or an offer to provide services by a performer
- **Negotiation**, allowing the customer and the performer to agree on how the work should be done and what will constitute customer satisfaction
- **Performance** of the assignment and completion
- **Acceptance**, closing the transaction provided the customer expresses satisfaction and agrees that the conditions were met.
Attaining Lean Production

- Focus on inventory reduction
- Build systems that help employees
- Reduce space requirements
- Develop close relationships with suppliers
- Educate suppliers
- Eliminate all but value-added activities
- Develop the workforce
- Make jobs more challenging
- Set sights on perfection!
Customer Interaction and Process Strategy

Degree of Interaction and Customization

Degree of Labor Intensity

Mass Service
- Commercial Banking
- Retailing
- Warehouse and catalog stores
- No frills airlines

Professional Service
- Personal banking
- Boutiques
- Law clinics
- General purpose law firms
- Limited service stockbroker
- Fast food restaurants
- Fine dining restaurants
- Hospitals
- Full-service stockbroker
- For-profit hospitals

Service Factory
- Airlines

Service Shop
- Hospitals
- Limited service stockbroker
- Law clinics
- Fine dining restaurants
Techniques for Improving Service Productivity

Strategy
- Separation
- Self-service
- Postponement
- Focus

Technique
- **Structure** service so customers must go where service is offered
- **Self-service** so customers examine, compare and evaluate at their own pace
- **Customizing** at delivery
- **Restricting** the offerings
Techniques for Improving Service Productivity - Continued

- Modules
  - Modular selection of service.
  - Modular production

- Automation
  - Separating services that lend themselves to automation
  - Precise personnel scheduling

- Scheduling
  - Clarifying the service options

- Training
  - Explaining problems
  - Improving employee flexibility
More Opportunities to Improve Service Processes

- Layout
- Human Resources
- Technology
Production Process & Technology Alternatives

# Different Products or Parts

<table>
<thead>
<tr>
<th>High</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIM</td>
<td>Dedicated Automation</td>
</tr>
</tbody>
</table>

Flexible Manufacturing System

Volume of Products or Parts

<table>
<thead>
<tr>
<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Purpose, NC, CNC</td>
<td></td>
</tr>
</tbody>
</table>
Areas of Technology

- Machine technology
- Automatic identification systems (AIS)
- Process control
- Vision system
- Robot
- Automated storage and retrieval systems (ASRS)
- Flexible manufacturing systems (FMS)
- Computer-integrated manufacturing (CIM)
Machine Technology

- Increased precision
- Increased productivity
- Increased flexibility
- Decreased pollution
- Decreased size
- Decreased power requirements
Process Control

- Increased process stability
- Increased process precision
- Real-time provision of information for process evaluation
- Multi-mode information presentation
Automatic Identification Systems (AIS)

- Improved data acquisition
- Increased scope of process automation
Vision Systems

- Particular aid to inspection
- Consistently accurate
- Never bored
- Modest cost
- Superior to individuals performing the same tasks
Robots

- Perform monotonous, or dangerous tasks, or those requiring significant strength or endurance
- Enhanced consistency, accuracy, speed strength, power when substituted for human effort
Automated Storage and Retrieval Systems (ASRS)

- Automated placement and withdrawal of parts and products
- Particularly useful in inventory and test areas of manufacturing firms
Automated Guided Vehicle (AGV)

- Electronically controlled movement of products and/or individuals
Flexible Manufacturing Systems (FMS)

- Computer controls both the workstation and the material handling equipment
- Computer control enhance flexibility
- Can economically produce low volume at high quality
- Reduced costs of changeover and low utilization
- Stringent communication requirement between components within it
Computer Integrated Manufacturing (CIM)

- Extension of flexible manufacturing systems
  - Backwards to engineering and inventory control
  - Forward into warehousing and shipping
  - Can also include financial and customer service areas

- Reducing the distinction between low-volume/high-variety, and high-volume/low-variety production

- Heavy reliance on information technology
**Computer Integrated Manufacturing**

**Top management** decides to make a product based on market opportunities, the company’s strength and weakness, and its strategic plan based on competitive advantage.

**OM** runs the production process, coordinating supplies, requesting components and materials, planning and scheduling operations, overseeing cost accounting, and arranging outgoing shipments.

**Computer-aided design (CAD)** designs the product, then analyzes it to assure quality and to extract data needed to plan the manufacturing process, design the molds and tools, and program the production machinery.

**Computer-aided manufacturing (CAM)** fabricates raw materials into components to be transferred to the assembly area.

**Automated storage and retrieval system (ASRS) and automated guided vehicles (AGVs)** move incoming materials and parts, work in progress, and final product.

**Robots** put the product together, test it with automated equipment, and box the finished product for shipment.
## Technology in Services

<table>
<thead>
<tr>
<th>Service Industry</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial services</td>
<td>Debit cards, electronic funds transfer, ATMs, Internet stock trading</td>
</tr>
<tr>
<td>Education</td>
<td>Electronic bulletin boards, on-line journals</td>
</tr>
<tr>
<td>Utilities and government</td>
<td>Automated one-man garbage trucks, optical mail sorters, scanners, flood warning systems</td>
</tr>
<tr>
<td>Restaurants and foods</td>
<td>Wireless orders from waiters to kitchen, robot butchering, transponders on cars to track drive-thrus</td>
</tr>
<tr>
<td>Communication</td>
<td>Electronic publishing, interactive TV</td>
</tr>
<tr>
<td>Hotels</td>
<td>Electronic check-in/check-out, electronic key/lock systems</td>
</tr>
<tr>
<td>Wholesale/retail trade</td>
<td>Point-of-sale terminals, e-commerce, electronic communication between store and supplier, bar coded data</td>
</tr>
</tbody>
</table>
## Technology in Services - Continued

<table>
<thead>
<tr>
<th>Service Industry</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation</td>
<td>Automatic toll booths, satellite-directed navigation systems, route planning, progress monitoring</td>
</tr>
<tr>
<td>Health care</td>
<td>On-line patient monitoring, on-line medical information systems, robotic surgery, expert system diagnosis assistance</td>
</tr>
<tr>
<td>Airlines</td>
<td>Ticketless travel, scheduling, Internet ticket sales, improved navigation and route planning</td>
</tr>
</tbody>
</table>
Process Reengineering

- The fundamental rethinking and radical redesign of business processes to bring about dramatic improvements in performance
- Relies on reevaluating the purpose of the process and questioning both the purpose and the underlying assumptions
- Requires reexamination of the basic process and its objectives
- Focuses on activities that cross boundaries
Showing Sensitivity to the Environment

- Make products recyclable
- Use recycled materials
- Use less harmful ingredients
- Use light components
- Use less energy
- Use less materials
Factors Affecting Process Alternatives

- Production flexibility
  - Product volume
  - Product variety
- Technology
- Cost
- Human resources
- Quality
- Reliability

These factors reduce the number of alternatives!