

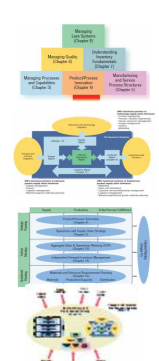
**CHAPTER FIVE**

**Manufacturing and Service Process Structures**

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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	
<b>5. Manufacturing and Service Process Structures</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
6. Managing Quality	X	X	X	X	X	X
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. Supply Management	X	X	X	X		X
11. Logistics Management	X	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	X-2



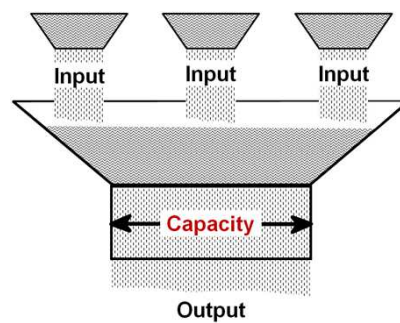
## Learning Objectives

1. Distinguish between capacity strategies
2. Identify and explain economies of scale
3. Compare and contrast the seven manufacturing process structures
4. Compare and contrast service process structures
5. Describe four operations layouts
6. Use break-even analysis for process selection

5-3

## Capacity Planning

- **Capacity:** the amount of output that can be created by, a process, with a given level of resources over a given time period



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## Economies & Diseconomies of scale

- **Economies of Scale:** as volume increases, unit costs decrease to an optimal level
- **Diseconomies of Scale:** unit costs increase as an operation's size increases

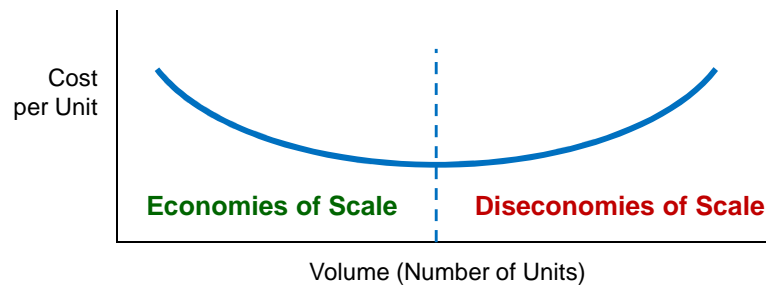


Figure 5-1

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## Reasons for Economies of Scale

1. Allocation of fixed costs
2. Equipment and construction costs
3. Lower costs for purchases
4. Learning curves

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## Capacity Planning Decisions

Time Frame (time required for changes)	Limiting Resource	Types of Capacity Change	Examples
Short term (0-6 months)	Low-skilled labor	Overt-time, part-time, temporary labor, layoffs	Restaurant wait staff, bank tellers, production line workers
	Equipment, space	Rental, leasing	Landscaping equipment, temporary storage
Medium term (6-24 months)	Specialized labor	Hiring, firing, contract labor	Engineers, accountants, machine operators, physicians
	Equipment, space	Leasing, subcontracting, equipment installation and renovation	Distribution/warehousing, fast-food restaurant rebuild, production line renovation
Long term (2+ years)	Physical plant	New building, outsourcing	Automotive plant open or closure, new office building

Table 5-1

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## Product-Process Matrix

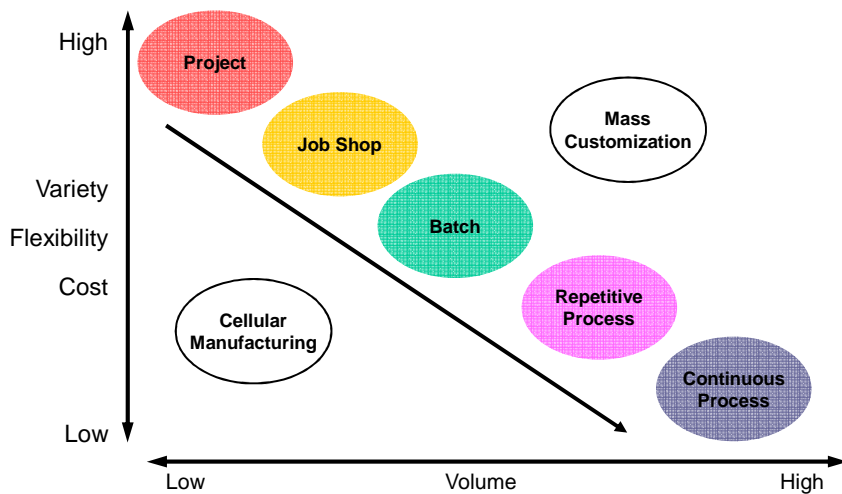


Figure 5-2

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## Activity

- Identify a product and competitive priorities for:
  - Project
  - Job Shop
  - Batch
  - Repetitive
  - Continuous
  - Mass Customization
  - Cellular Manufacturing



5-9

## Process Structure and Market Orientation



- **Engineer to Order (ETO):** unique, customized products



- **Make to Order (MTO):** similar design, customized during production



- **Assemble to Order (ATO):** produced from standard components and modules



- **Make to Stock (MTS):** goods made and held in inventory in advance of customer orders

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## Service Process Matrix

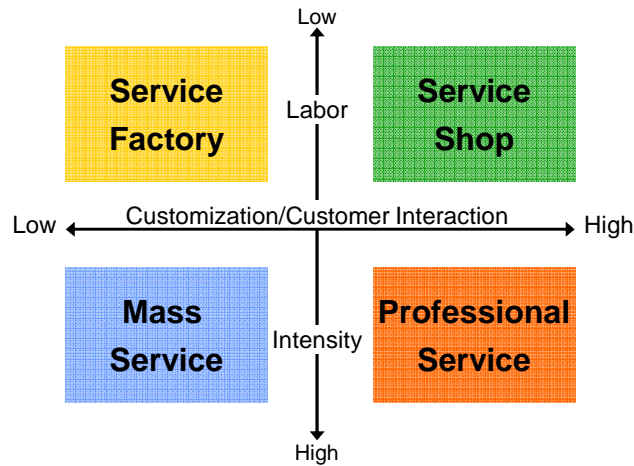


Figure 5-3

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## Activity

- Think of an example of each:
  - Service Factory
  - Service Shop
  - Mass Service
  - Professional Service
- Think of the last service you purchased:
  - What category was it?
  - What changes can you suggest to move it to another category?
  - What could be the advantages of the changes?



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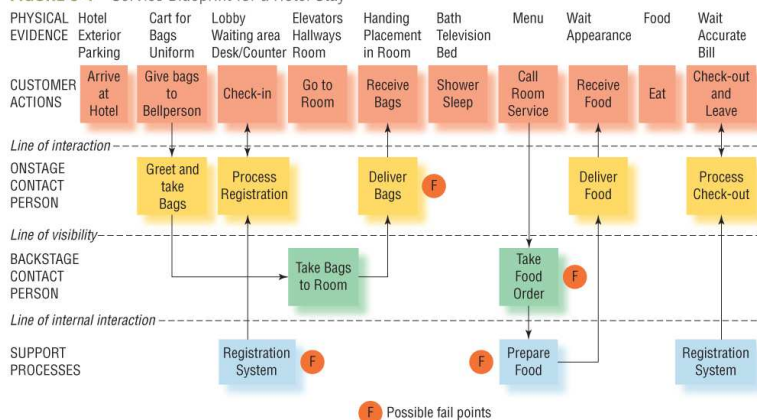
## Service Blueprinting

- **Customer actions:** all actions done by customers during service delivery
- **Front office:** employee actions in the face-to-face encounter
- **Back office:** behind the scenes activities
- **Support processes:** activities necessary for the service, done by employees without direct customer contact
- **Physical evidence:** tangibles the customers see or collect from the organization

5-13

## Service Blueprinting

FIGURE 5-4 Service Blueprint for a Hotel Stay



Sources: <http://knowledge.wpcarey.asu.edu/article.cfm?articleid=1546>; and M. J. Bitner, A. L. Ostrom, and F. N. Morgan, "Service Blueprinting: A Practical Technique for Service Innovation," *California Management Review* 50, no. 3 (Spring 2008), p. 66.

Figure 5-4

5-14

## Operations Layout

- **Fixed position:** product cannot be moved during production – house.
- **Process layout:** groups together similar resources – fitness center.
- **Product layout:** resources arranged by regularly occurring sequence of activities – car manufacturer.

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## Line Balancing in Product Layouts

Used to assign individual tasks to work areas for a desired output rate

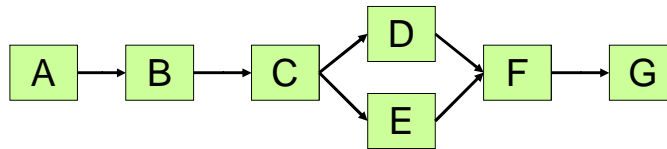
1. Determine precedence relationships
2. Calculate **Takt time** =  $\frac{\text{available production time per day}}{\text{output needed per day}}$
3. Determine minimum number of work stations =  $\frac{\text{Total of all task times}}{\text{takt time}}$
4. Determine efficiency =  $\frac{\text{sum of all task times}}{[\text{actual work stations} \times \text{takt time}]} \times 100$

5-16



## Line Balancing

Task	Predecessors	Time (minutes)
A Shape dough	None	2
B Add pizza sauce	A	1
C Add cheese	B	2
D Add sausage	C	0.75
E Add pepperoni	C	1
F Package pizza	D, E	1.5
G Label package	F	0.5
Total Time:		8.75



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## Break Even Analysis

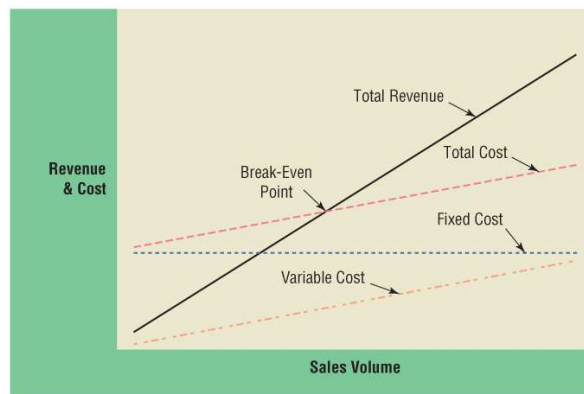


FIGURE 5-7  
Break-Even Point

Figure 5-4

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## Break Even Point

A firm has variable costs of per unit of \$3 and annual fixed costs of \$30,000. What is the break-even point if the sales prices is 48 per unit

$$\textbf{Total Revenue = Total Cost}$$

$$\text{TR} = \$8 * \text{volume} \text{ and } \text{TC} = \$30,000 + \$3 * \text{volume}$$

$$\$8 * \text{volume} = \$30,000 + \$3 * \text{volume}$$

$$\$5 * \text{volume} = \$30,000$$

$$\text{volume} = 6,000 \text{ units per year}$$

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## Manufacturing/Service Process Summary

1. Strategic capacity decisions include when, where and how much to adjust
2. Economics/Diseconomies of scale affect costs per unit
3. Product-process matrix classifies processes based on volume and variety
4. Service are categorized by customization and labor/capital intensity
5. Services processes can be front or back office
6. Layouts should fit with processes used
7. Process automation affects costs and capabilities

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