

**Operations
Management
Chapter 8**

Location Strategies

Outline

- ☑ ***The Strategic Importance Of Location***
- ☑ ***Factors that affect Location decision***

Outline – Continued

- ☑ ***Methods Of Evaluating Location Alternatives***
 - ☑ ***The Factor-Rating Method***
 - ☑ ***Locational Break-Even Analysis***
 - ☑ ***Center-of-Gravity Method***
 - ☑ ***The Transportation Method***

Outline – Continued

- ☑ ***Service Location Strategy***
 - ☑ ***How Hotel Chains Select Sites***
 - ☑ ***The Telemarketing Industry***
 - ☑ ***Geographic Information Systems***

Location Strategy

- ☑ ***One of the most important decisions a firm makes***
- ☑ ***Increasingly global in nature***
- ☑ ***Long term impact and decisions are difficult to change***
- ☑ ***The objective is to maximize the benefit of location to the firm***

The strategic importance of location

Objective of Location Strategy



Maximize the benefit of location to the firm

- Industrial location decisions is minimizing costs
- Retail and professional service organization focuses on maximizing revenue

Location Decisions

- ☑ ***Long-term decisions***
- ☑ ***Decisions made infrequently***
- ☑ ***Decision greatly affects both fixed and variable costs***
- ☑ ***Once committed to a location, many resource and cost issues are difficult to change***

Factors That Affect Location Decisions

Labor Productivity

Exchange Rates and Currency Risks

Costs

Attitudes

Proximity to Markets

Proximity to Suppliers

***Proximity to Competitors
(Clustering)***

Factors That Affect Location Decisions

☑ *Labor productivity*

- ☑ *Wage rates are not the only cost*
- ☑ *Lower productivity may increase total cost*

$$\frac{\text{Labor cost per day}}{\text{Productivity (units per day)}} = \text{cost per unit}$$

Connecticut

$$\frac{\$70}{60 \text{ units}} = \$1.17 \text{ per unit}$$

Juarez

$$\frac{\$25}{20 \text{ units}} = \$1.25 \text{ per unit}$$

Factors That Affect Location Decisions

- ☑ ***Exchange rates and currency risks***
 - ☑ ***Can have a significant impact on cost structure***
 - ☑ ***Rates change over time***
- ☑ ***Costs***
 - ☑ ***Tangible - easily measured costs such as utilities, labor, materials, taxes***
 - ☑ ***Intangible - less easy to quantify and include education, public transportation, community, quality-of-life***

Factors That Affect Location Decisions

☑ *Attitudes*

- ☑ *National, state, local governments toward private and intellectual property, zoning, pollution, employment stability*
- ☑ *Worker attitudes towards turnover, unions, absenteeism*
- ☑ *Globally cultures have different attitudes towards punctuality, legal, and ethical issues*

Factors That Affect Location Decisions

- ☑ ***Proximity to markets***
 - ☑ ***Very important to services***
 - ☑ ***JIT systems or high transportation costs may make it important to manufacturers***

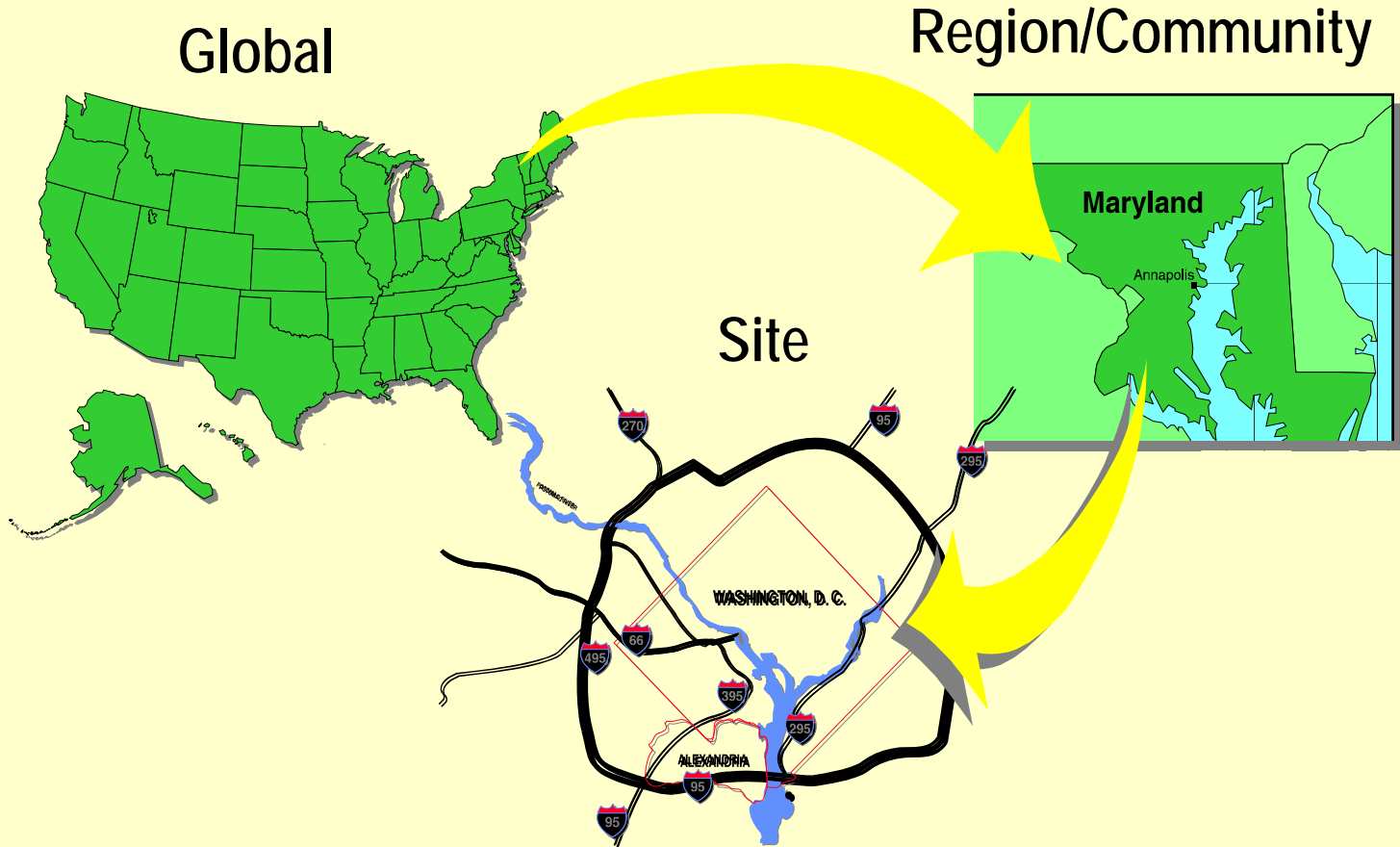
- ☑ ***Proximity to suppliers***
 - ☑ ***Perishable goods, high transportation costs, bulky products***

Factors That Affect Location Decisions

- ☑ ***Proximity to competitors***
 - ☑ ***Called clustering***
 - ☑ ***Often driven by resources such as natural, information, capital, talent***
 - ☑ ***Found in both manufacturing and service industries***

Factors that affect location decisions

Location Decision Sequence



Location Decisions

Country Decision

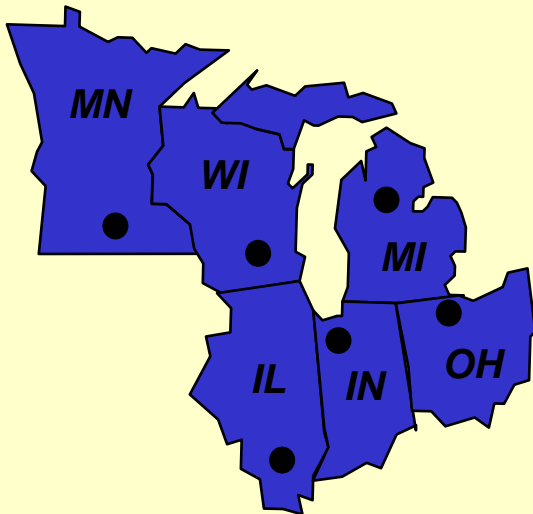


Critical Success Factors

- 1. Political risks, government rules, attitudes, incentives**
- 2. Cultural and economic issues**
- 3. Location of markets**
- 4. Labor availability, attitudes, productivity, costs**
- 5. Availability of supplies, communications, energy**
- 6. Exchange rates and currency risks**

Location Decisions

Region/ Community Decision



Critical Success Factors

- **Attractiveness of region**
- **Labor availability, costs, attitudes towards unions**
- **Costs and availability of utilities**
- **Environmental regulations**
- **Government incentives and fiscal policies**
- **Proximity to raw materials and customers**
- **Land/construction costs**

Location Decisions

Site Decision



Critical Success Factors

- 1. Site size and cost**
- 2. Air, rail, highway, and waterway systems**
- 3. Zoning restrictions**
- 4. Nearness of services/ supplies needed**
- 5. Environmental impact issues**

Location Evaluation Methods

- ◆ Factor-rating method
- ◆ Locational break-even analysis
- ◆ Center of gravity method
- ◆ Transportation model

Factor-Rating Method

- ☑ *Popular because a wide variety of factors can be included in the analysis*
- ☑ *Six steps in the method*
 1. *Develop a list of relevant factors called critical success factors*
 2. *Assign a weight to each factor*
 3. *Develop a scale for each factor*
 4. *Score each location for each factor*
 5. *Multiply score by weights for each factor for each location*
 6. *Recommend the location with the highest point score*

Location Factor Rating

LOCATION FACTOR

Labor pool and climate

Proximity to suppliers

Wage rates

Community environment

Proximity to customers

Shipping modes

Air service

Location Factor Rating

LOCATION FACTOR	WEIGHT
Labor pool and climate	.30
Proximity to suppliers	.20
Wage rates	.15
Community environment	.15
Proximity to customers	.10
Shipping modes	.05
Air service	.05

Location Factor Rating

SCORES (0 TO 100)

LOCATION FACTOR	WEIGHT	Site 1	Site 2	Site 3
Labor pool and climate	.30	80	65	90
Proximity to suppliers	.20	100	91	75
Wage rates	.15	60	95	72
Community environment	.15	75	80	80
Proximity to customers	.10	65	90	95
Shipping modes	.05	85	92	65
Air service	.05	50	65	90

Location Factor Rating

LOCATION FACTOR	WEIGHT	WEIGHTED SCORES		
		<i>Site 1</i>	<i>Site 2</i>	<i>Site 3</i>
Labor pool and climate	.30	24.00	19.50	27.00
Proximity to suppliers	.20	20.00	18.20	15.00
Wage rates	.15	9.00	14.25	10.80
Community environment	.15	11.25	12.00	12.00
Proximity to customers	.10	6.50	9.00	9.50
Shipping modes	.05	4.25	4.60	3.25
Air service	.05	2.50	3.25	4.50
		77.50	80.80	82.05

Weighted Score Site 1 = (0.30)(80) = 24

Locational Break-Even Analysis

- ☑ *Method of cost-volume analysis used for industrial locations*
- ☑ *Three steps in the method*
 1. *Determine fixed and variable costs for each location*
 2. *Plot the cost for each location*
 3. *Select location with lowest total cost for expected production volume*

Locational Break-Even Analysis Example

You're an analyst for AC Delco. You're considering a new manufacturing plant in Akron, Bowling Green, or Chicago. Fixed costs per year are \$30k, \$60k, & \$110k respectively. Variable costs per case are \$75, \$45, & \$25 respectively. The price per case is \$120. What is the best location for an expected volume of 2,000 cases per year?



Locational Break-Even Analysis Example

Three locations:

<i>City</i>	<i>Fixed Cost</i>	<i>Variable Cost</i>	<i>Total Cost</i>
<i>Akron</i>	<i>\$30,000</i>	<i>\$75</i>	<i>\$180,000</i>
<i>Bowling Green</i>	<i>\$60,000</i>	<i>\$45</i>	<i>\$150,000</i>
<i>Chicago</i>	<i>\$110,000</i>	<i>\$25</i>	<i>\$160,000</i>

Selling price = \$120

Expected volume = 2,000 units

Total Cost = Fixed Cost + Variable Cost x Volume

◆ For Akron

◆ $TC = 30,000 + 75(2,000) = 180,000$

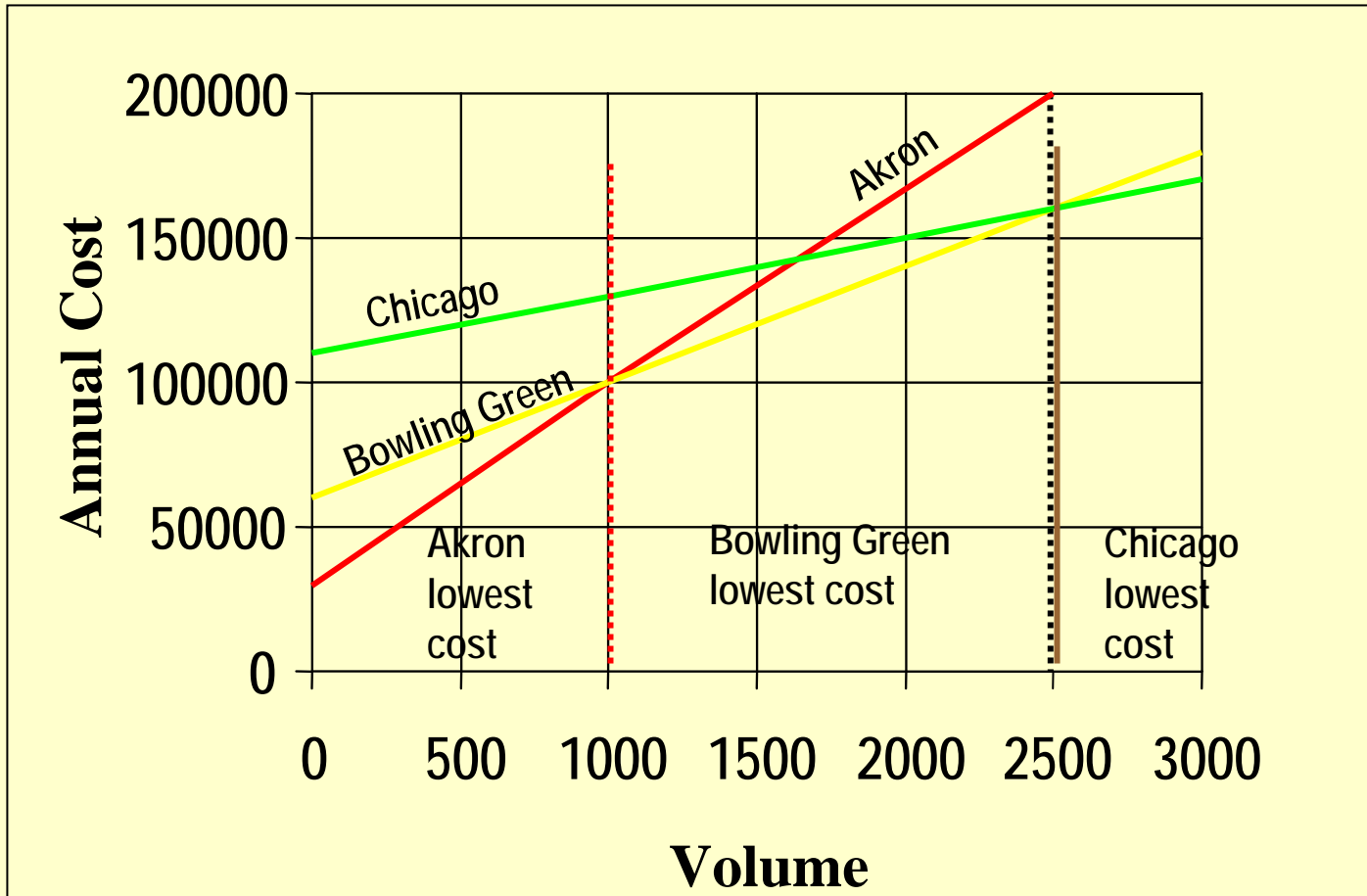
◆ For Bowling Green

◆ $TC = 60,000 + 45(2,000) = 150,000$

◆ For Chicago

◆ $TC = 110,000 + 25(2,000) = 160,000$

Locational Break-Even Crossover Chart



Center-of-Gravity Method

- ☑ ***Finds location of distribution center that minimizes distribution costs***
- ☑ ***Considers***
 - ☑ ***Location of markets***
 - ☑ ***Volume of goods shipped to those markets***
 - ☑ ***Shipping cost (or distance)***

Center-of-Gravity Method

- ☑ *Place existing locations on a coordinate grid*
 - ☑ *Grid origin and scale is arbitrary*
 - ☑ *Maintain relative distances*
- ☑ *Calculate X and Y coordinates for 'center of gravity'*
 - ☑ *Assumes cost is directly proportional to distance and volume shipped*

Center-of-Gravity Method

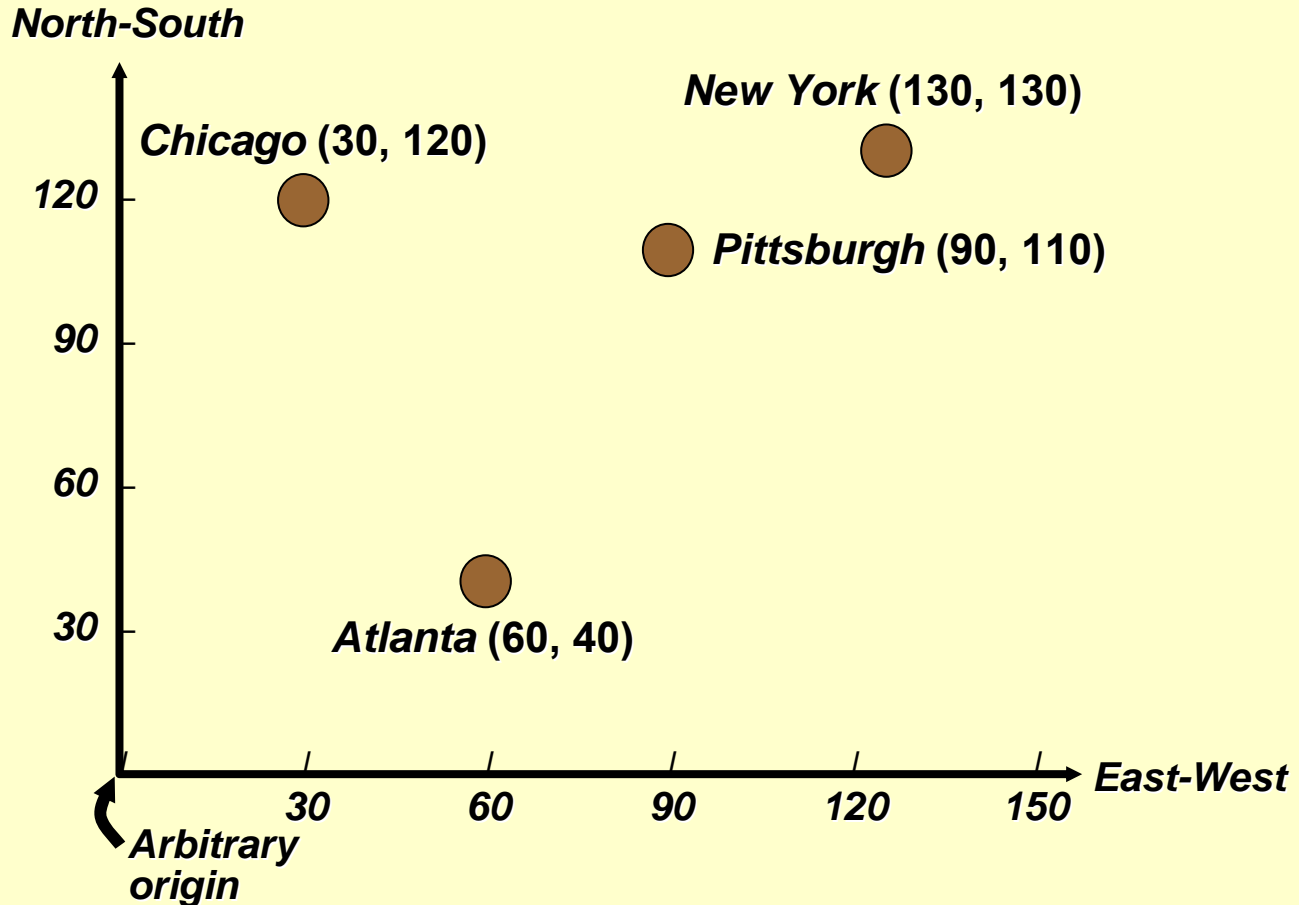
$$x - \text{coordinate} = \frac{\sum_i d_{ix} Q_i}{\sum_i Q_i}$$

$$y - \text{coordinate} = \frac{\sum_i d_{iy} Q_i}{\sum_i Q_i}$$

where

- d_{ix} = *x-coordinate of location i*
- d_{iy} = *y-coordinate of location i*
- Q_i = *Quantity of goods moved to or from location i*

Center-of-Gravity Method



Center-of-Gravity Method

<i>Store Location</i>	<i>Number of Containers Shipped per Month</i>
<i>Chicago (30, 120)</i>	<i>2,000</i>
<i>Pittsburgh (90, 110)</i>	<i>1,000</i>
<i>New York (130, 130)</i>	<i>1,000</i>
<i>Atlanta (60, 40)</i>	<i>2,000</i>

x-coordinate = _____

=

y-coordinate = _____

=

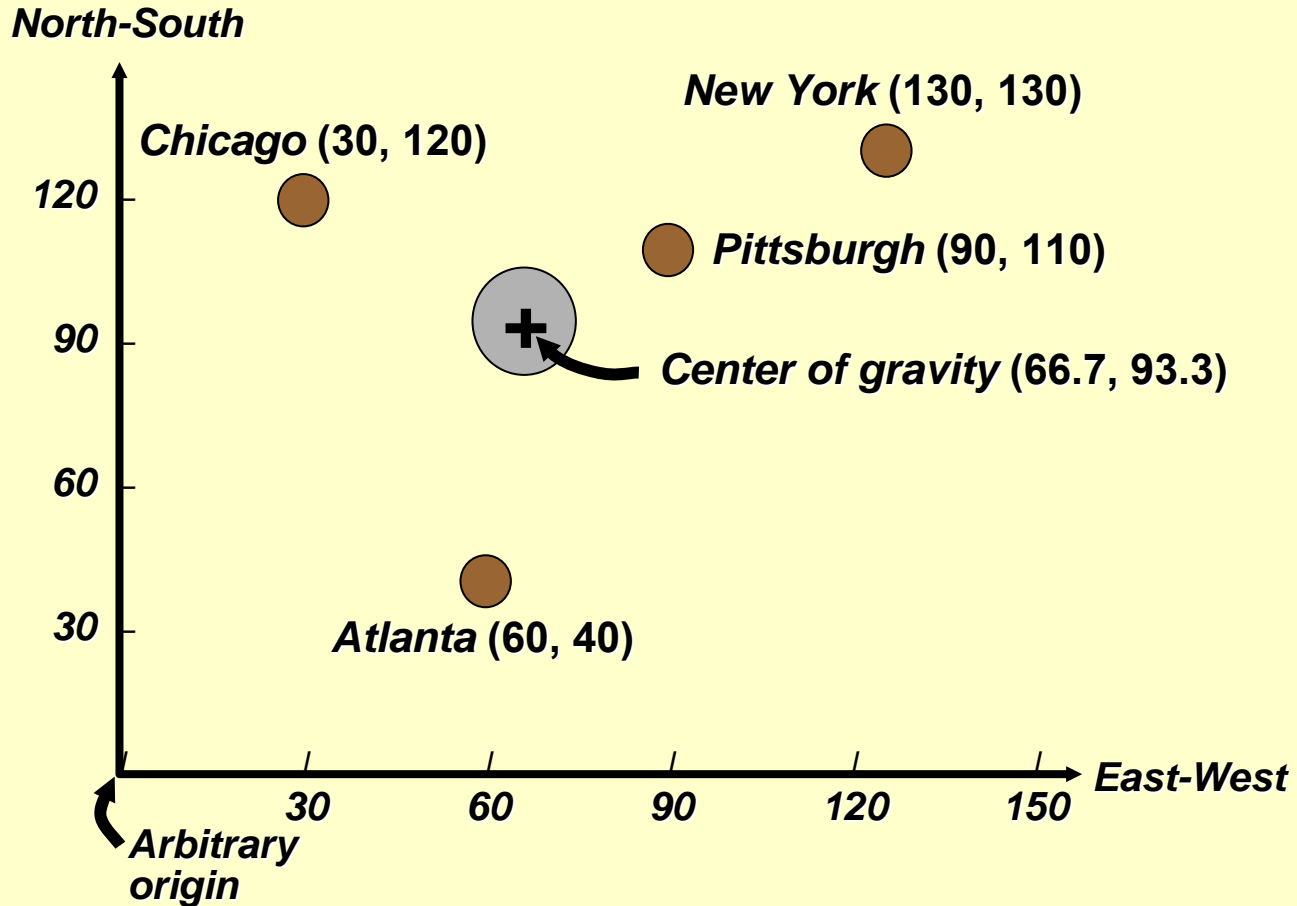
Center-of-Gravity Method

<i>Store Location</i>	<i>Number of Containers Shipped per Month</i>
<i>Chicago (30, 120)</i>	<i>2,000</i>
<i>Pittsburgh (90, 110)</i>	<i>1,000</i>
<i>New York (130, 130)</i>	<i>1,000</i>
<i>Atlanta (60, 40)</i>	<i>2,000</i>

$$\begin{aligned}x\text{-coordinate} &= \frac{(30)(2000) + (90)(1000) + (130)(1000) + (60)(2000)}{2000 + 1000 + 1000 + 2000} \\ &= 66.7\end{aligned}$$

$$\begin{aligned}y\text{-coordinate} &= \frac{(120)(2000) + (110)(1000) + (130)(1000) + (40)(2000)}{2000 + 1000 + 1000 + 2000} \\ &= 93.3\end{aligned}$$

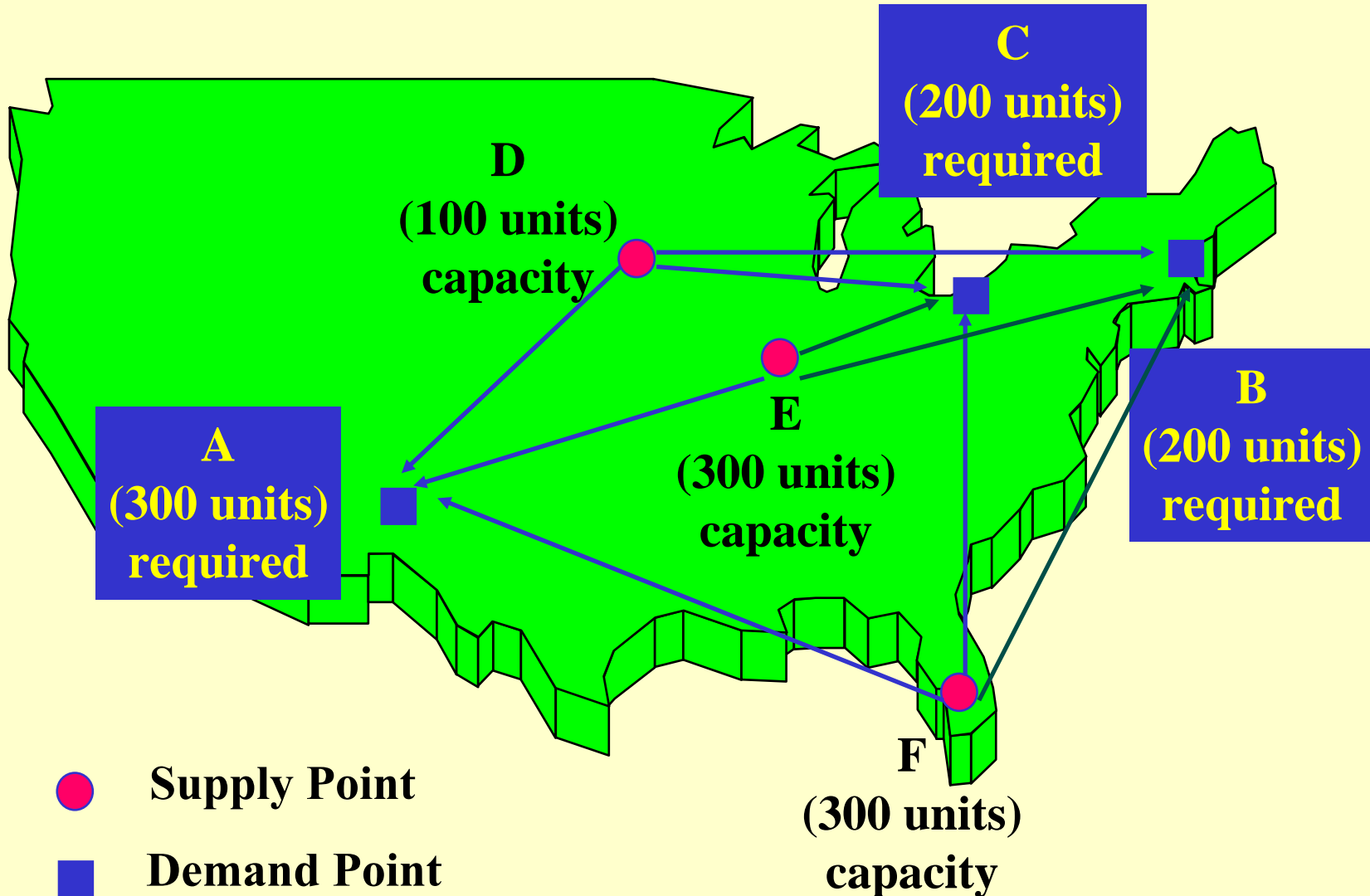
Center-of-Gravity Method



Transportation Model

- ☑ ***Finds amount to be shipped from several points of supply to several points of demand***
- ☑ ***Solution will minimize total production and shipping costs***
- ☑ ***A special class of linear programming problems***

Transportation Problem



	A	B	C		
D	100	5	4	3	100
E	8	200	4	3	300
F	200	9	7	5	300
	300	200	200		700

Total Cost = (100 x 5) + (200 x 4) + (100 x 3)
+ (200 x 9) + (100x5) = \$ 3,900

	A	B	C	
D	5	4	3	100
E	8	4	3	300
F	9	7	5	300
X				700
	600	400	400	1400

Total transportation with Y location = COST X

	A	B	C	
D	5	4	3	100
E	8	4	3	300
F	9	7	5	300
Y				700
	600	400	400	1400

Total transportation with Y location = COST Y

Service Location Strategy

1. Purchasing power of customer-drawing area
2. Service and image compatibility with demographics of the customer-drawing area
3. Competition in the area
4. Quality of the competition
5. Uniqueness of the firm's and competitors' locations
6. Physical qualities of facilities and neighboring businesses
7. Operating policies of the firm
8. Quality of management

How Hotel Chains Select Sites

- ☑ *Location is a strategically important decision in the hospitality industry*
- ☑ *La Quinta started with 35 independent variables and worked to refine a regression model to predict profitability*
- ☑ *The final model had only four variables*
 - ☑ *Price of the inn*
 - ☑ *Median income levels*
 - ☑ *State population per inn*
 - ☑ *Location of nearby colleges*

Telemarketing/Internet Industries

- ☑ *Require neither face-to-face contact nor movement of materials*
- ☑ *Have very broad location options*
- ☑ *Traditional variables are no longer relevant*
- ☑ *Cost and availability of labor may drive location decisions*

Geographic Information Systems (GIS)

- ✓ *New tool to help in location analysis*
- ✓ *Enables more complex demographic analysis*
- ✓ *Available data bases include*
 - ✓ *Detailed census data*
 - ✓ *Detailed maps*
 - ✓ *Utilities*
 - ✓ *Geographic features*
 - ✓ *Locations of major services*

Geographic Information Systems (GIS)

