Operations Management

CHAPTER VIII

Location Strategies

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Outline

- ☑ *Global Company Profile: Federal Express*
- ☑ *The Strategic Importance Of Location*

Outline – Continued

- ☑ *Factors That Affect Location Decisions*
  - ☑ *Labor Productivity*
  - ☑ *Exchange Rates and Currency Risks*
  - ☑ *Costs*
  - ☑ *Attitudes*
  - ☑ *Proximity to Markets*
  - ☑ *Proximity to Suppliers*
  - ☑ *Proximity to Competitors (Clustering)*

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

Learning Objectives

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

Identify or Define:

- ☑ ***Objective of location strategy***
- ☑ ***International location issues***
- ☑ ***Clustering***
- ☑ ***Geographic information systems***

Learning Objectives

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

Describe or Explain:

- ☑ ***Three methods of solving the location problem***
  - ☑ ***Factor-rating method***
  - ☑ ***Locational breakeven analysis***
  - ☑ ***Center-of-gravity method***
- ☑ ***Describe the factors affecting location decisions***

Federal Express

- ☑ Central hub concept
  - ☑ Enables service to more locations with fewer aircraft
  - ☑ Enables matching of aircraft flights with package loads
  - ☑ Reduces mishandling and delay in transit because there is total control of packages from pickup to delivery

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*

Location and Innovation

- ☑ Cost is not always the most important aspect of a strategic decision
- ☑ Four key attributes when strategy is based on innovation
  - ☑ High-quality and specialized inputs
  - ☑ An environment that encourages investment and local rivalry
  - ☑ A sophisticated local market
  - ☑ Local presence of related and supporting industries

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*

Location Decisions

Country Decision

Figure 8.1

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

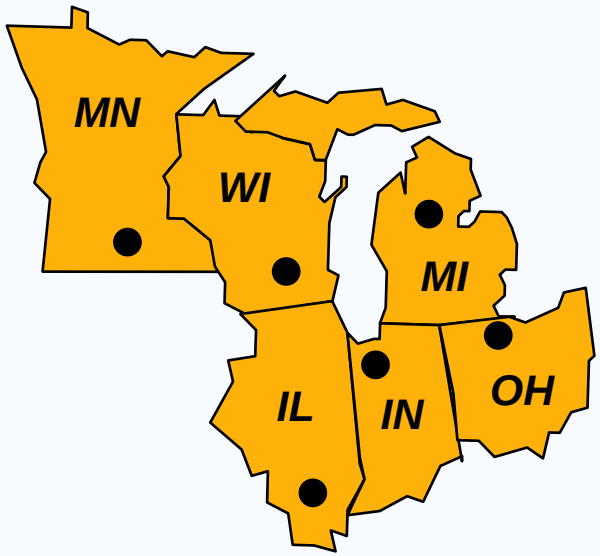


Figure 8.1

Critical Success Factors

1. Corporate desires
2. Attractiveness of region
3. Labor availability, costs, attitudes towards unions
4. Costs and availability of utilities
5. Environmental regulations
6. Government incentives and fiscal policies
7. Proximity to raw materials and customers
8. Land/construction costs

Location Decisions

Site Decision

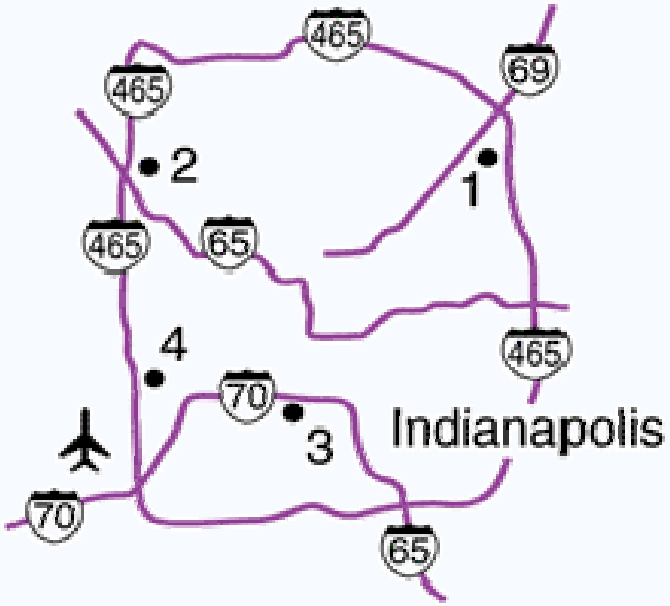


Figure 8.1

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

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	*Juarez*
$\frac{\$70}{60 \text{ units}} = \$1.17$ *per unit*	$\frac{\$25}{20 \text{ units}} = \$1.25$ *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*

Growth Competitiveness Index of Countries

Country	2004 Rank	2003 Rank
Finland	1	1
USA	2	2
Sweden	3	3
Taiwan	4	5
Japan	9	11
UK	11	15
Germany	13	13
Canada	15	16
New Zealand	18	14
France	27	26
Russia	70	70

Clustering of Companies

Industry	Locations	Reason for clustering
Wine makers	Napa Valley (US) Bordeaux region (France)	Natural resources of land and climate
Software firms	Silicon Valley, Boston, Bangalore (India)	Talent resources of bright graduates in scientific/technical areas, venture capitalists nearby
Race car builders	Huntington/North Hampton region (England)	Critical mass of talent and information

Table 8.3

Clustering of Companies

Industry	Locations	Reason for clustering
Theme parks	Orlando	A hot spot for entertainment, warm weather, tourists, and inexpensive labor
Electronic firms	Northern Mexico	NAFTA, duty free export to US
Computer hardware manufacturers	Singapore, Taiwan	High technological penetration rate and per capita GDP, skilled/educated workforce with large pool of engineers

Table 8.3

Clustering of Companies

Industry	Locations	Reason for clustering
Fast food chains	Sites within one mile of each other	Stimulate food sales, high traffic flows
General aviation aircraft	Wichita, Kansas	Mass of aviation skills

Table 8.3

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*

Factor-Rating Example

Critical Success Factor	Weight	Scores (out of 100) France	Scores (out of 100) Denmark	Weighted Scores France	Weighted Scores Denmark
Labor availability and attitude	.25	70	60	(.25)(70) = 17.5	(.25)(60) = 15.0
People-to car ratio	.05	50	60	(.05)(50) = 2.5	(.05)(60) = 3.0
Per capita income	.10	85	80	(.10)(85) = 8.5	(.10)(80) = 8.0
Tax structure	.39	75	70	(.39)(75) = 29.3	(.39)(70) = 27.3
Education and health	.21	60	70	(.21)(60) = 12.6	(.21)(70) = 14.7
Totals	1.00			70.4	68.0

Table 8.3

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

Three locations:

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

Selling price = $120

Expected volume = 2,000 *units*

Total Cost = Fixed Cost + Variable Cost x Volume

Locational Break-Even Analysis Example

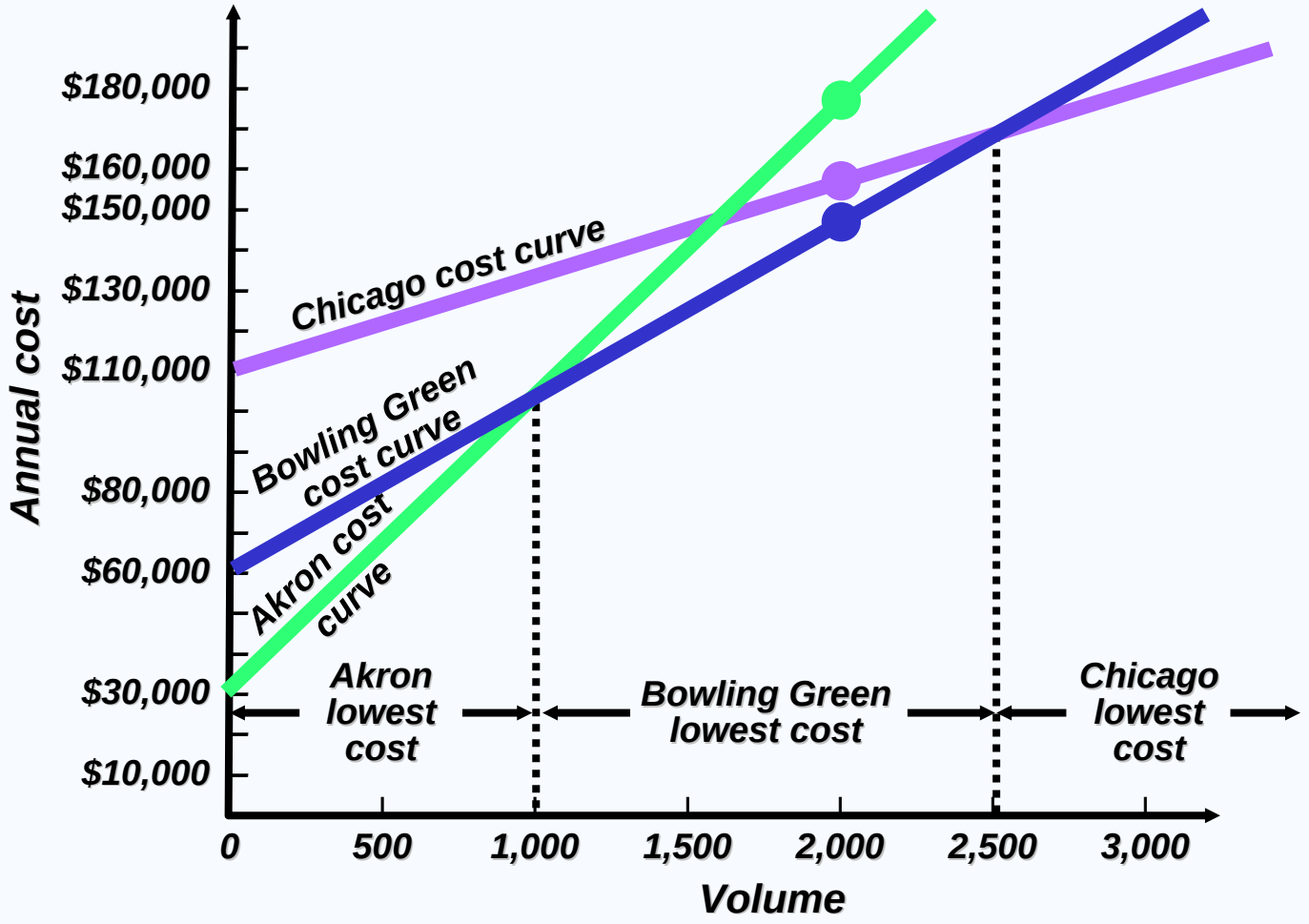


Figure 8.2

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

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

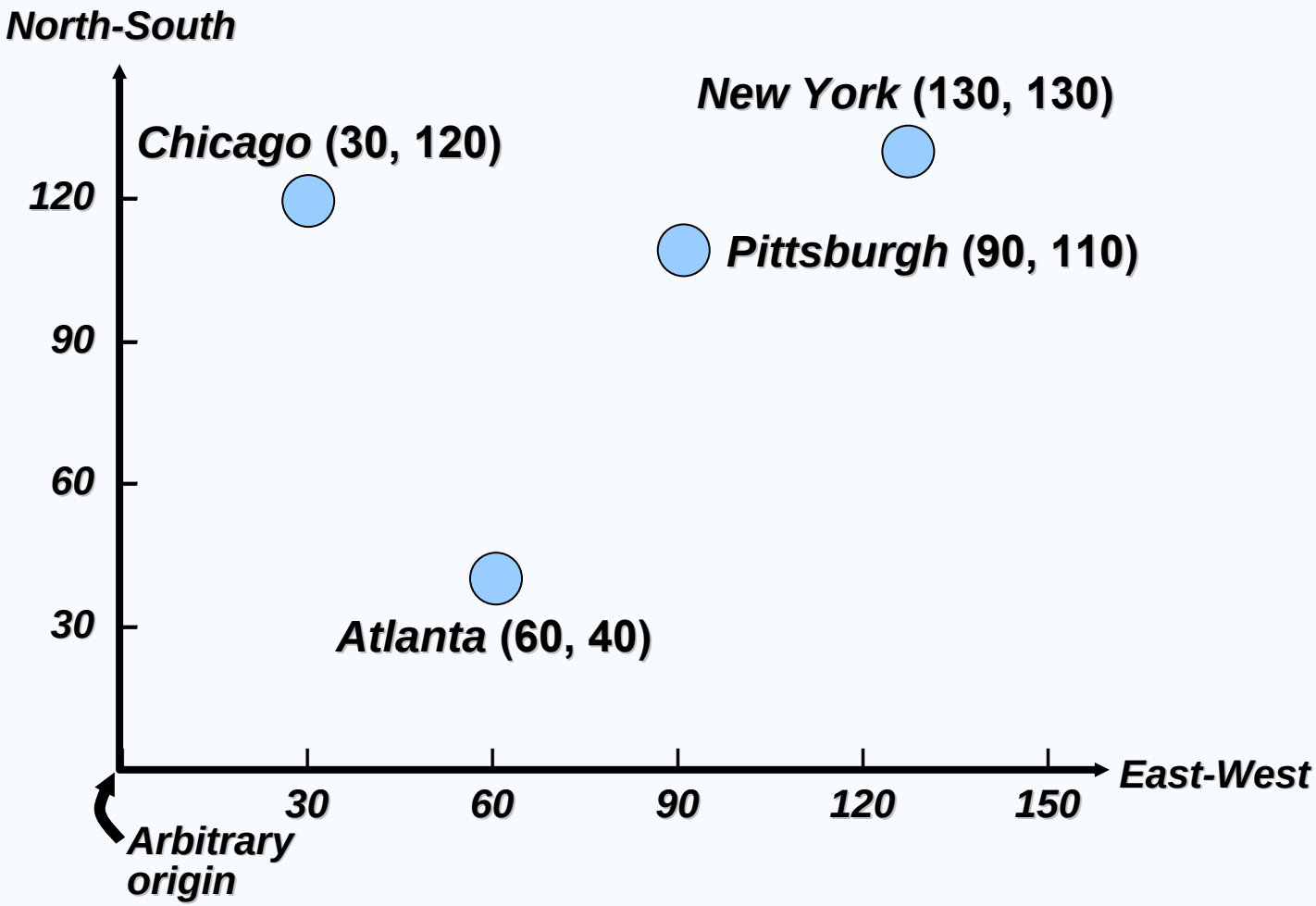
$$y\text{ - coordinate} = \frac{\sum_i d_{iy} Q_i}{\sum_i Q_i}$$

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

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

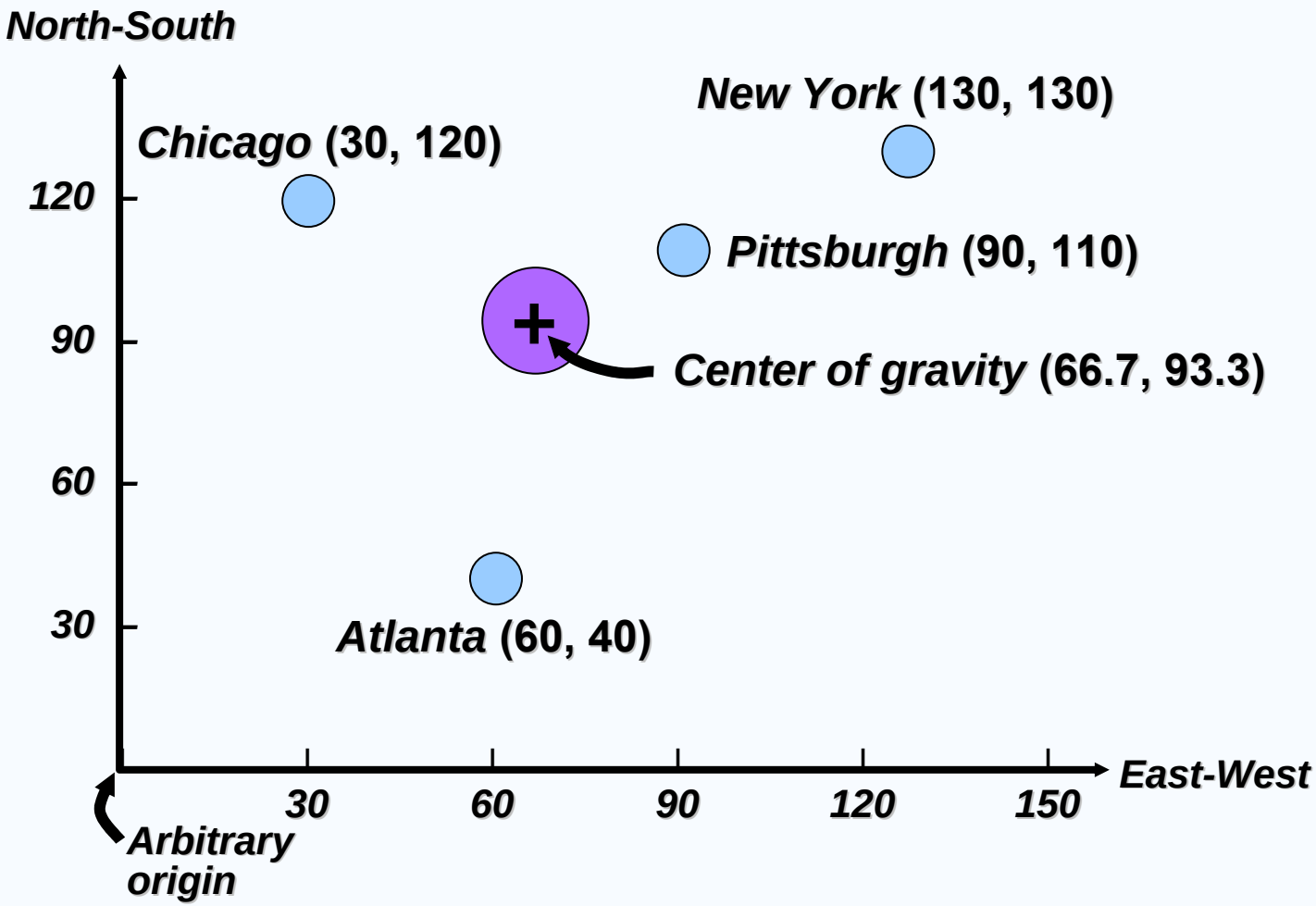
$$x\text{-coordinate} = \frac{(30)(2000) + (90)(1000) + (130)(1000) + (60)(2000)}{2000 + 1000 + 1000 + 2000}$$

$$= 66.7$$

$$y\text{-coordinate} = \frac{(120)(2000) + (110)(1000) + (130)(1000) + (40)(2000)}{2000 + 1000 + 1000 + 2000}$$

$$= 93.3$$

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*

Worldwide Distribution of Volkswagens and Parts

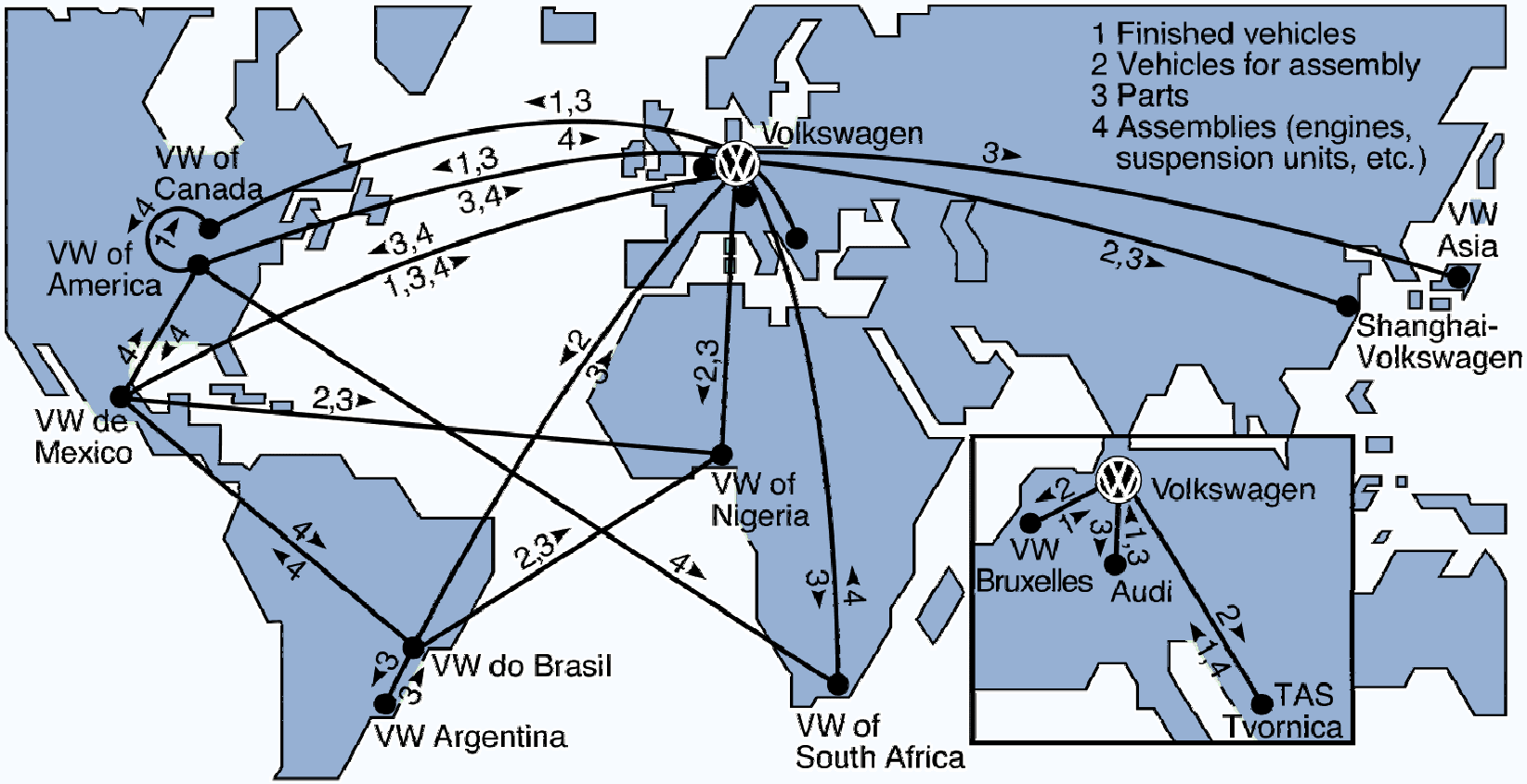


Figure 8.4

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

Location Strategies

Service/Retail/Professional Location	Goods-Producing Location
Revenue Focus	**Cost Focus**
Volume/revenue	*Tangible costs*
Drawing area; purchasing power	*Transportation cost of raw material*
Competition; advertising/pricing	*Shipment cost of finished goods*
	Energy and utility cost; labor; raw material; taxes, and so on
Physical quality	
Parking/access; security/lighting; appearance/image	*Intangible and future costs*
	Attitude toward union
Cost determinants	*Quality of life*
Rent	*Education expenditures by state*
Management caliber	*Quality of state and local government*
Operations policies (hours, wage rates)	

Table 8.4

Location Strategies

Service/Retail/Professional Location	Goods-Producing Location
Techniques	Techniques
Regression models to determine importance of various factors	Transportation methods
Factor-rating method	Factor-rating method
Traffic counts	Locational break-even analysis
Demographic analysis of drawing area	Crossover charts
Purchasing power analysis of area	
Center-of-gravity method	
Geographic information systems	

Table 8.4

Location Strategies

Service/Retail/Professional Location	Goods-Producing Location
Assumptions	**Assumptions**
Location is a major determinant of revenue	Location is a major determinant of cost
High customer-contact issues are critical	Most major costs can be identified explicitly for each site
Costs are relatively constant for a given area; therefore, the revenue function is critical	Low customer contact allows focus on the identifiable costs
	Intangible costs can be evaluated

Table 8.4

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

$r^2 = .51$

51% of the profitability is predicted by just these four variables!

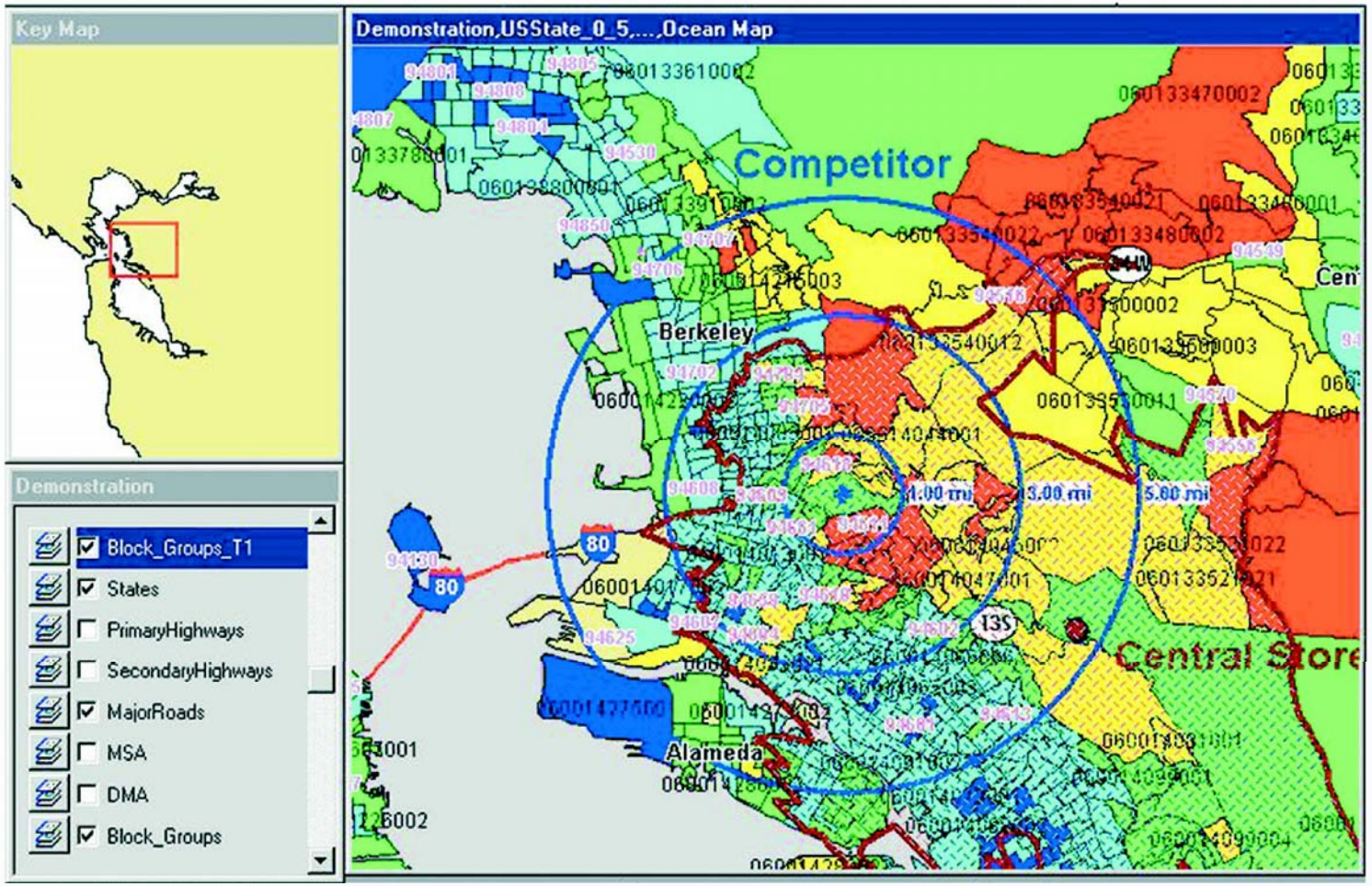
Telemarketing/Internet Industries

- ☑ *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)



Group Assignment
7-11 Case

- ☑ *Observe 7-11 sites as your group members*
- ☑ *Study there location/ layout and dimension*
- ☑ *Operations management in each site*
  - ☑ *Goods*
  - ☑ *HR*
- ☑ *Flow of goods in-and-out (directions)*
- ☑ *Flow of shelf management (pathways)*
- ☑ *Analysis your group data, Why and How the benefits of there design and operations management*