Chapter 5

Network Design in the Supply Chain

Learning Objectives

- Understand the role of network design in a supply chain.
- Identify factors influencing supply chain network design decisions.
- Develop a framework for making network design decisions.
- Use optimization for facility location and capacity allocation decisions.

Network Design Decisions

- **Facility role**
  - What role, what processes?
- **Facility location**
  - Where should facilities be located?
- **Capacity allocation**
  - How much capacity at each facility?
- **Market and supply allocation**
  - What markets? Which supply sources?

Factors Influencing Network Design Decisions

- Strategic factors
- Technological factors
- Macroeconomic factors
  - Tariffs and tax incentives
  - Exchange-rate and demand risk
  - Freight and fuel costs
- Political

Contd…

Factors Influencing Network Design Decisions

- Infrastructure factors
- Competitive factors
  - Positive externalities between firms
  - Locating to split the market
- Customer response time and local presence
- Logistics and facility costs

Framework for Network Design Decisions

- **Phase I: Define a supply chain strategy/design**
  - Clear definition of the firm's competitive strategy
  - Forecast the likely evolution of global competition
  - Identify constraints on available capital
  - Determine growth strategy

Socio Economic Factors in Choice of Facility Location

- What role do socio-economic factors play in the selection of the facility location?

- How do state policies aimed at promoting balanced regional development, shape the supply chain network designs?

Framework for Network Design Decisions

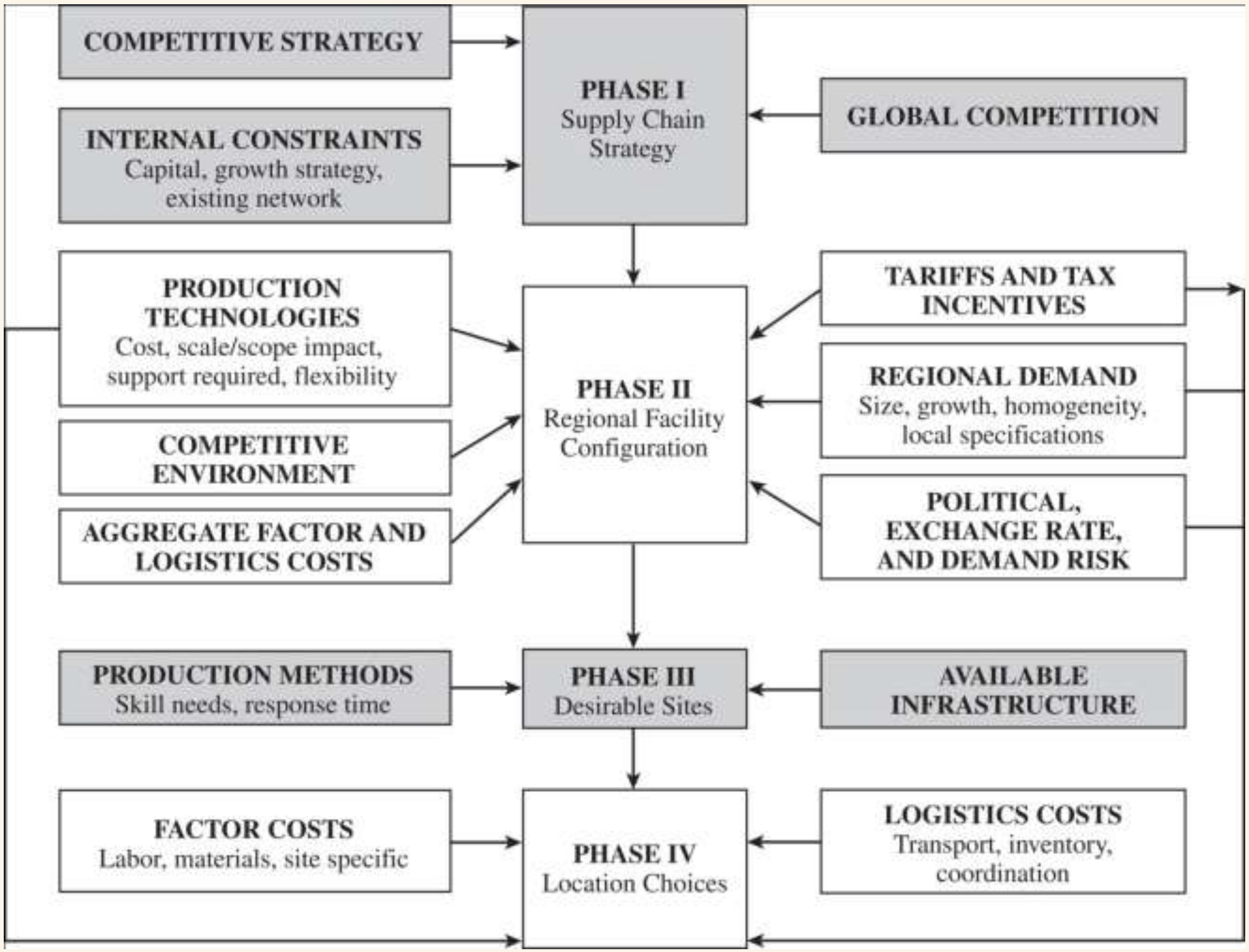


Figure 5-2

Framework for Network Design Decisions

- **Phase II: Define the regional facility configuration**
  - Forecast of the demand by country or region
  - Economies of scale or scope
  - Identify demand risk, exchange-rate risk, political risk, tariffs, requirements for local production, tax incentives, and export or import restrictions
  - Identify competitors

Framework for Network Design Decisions

- **Phase III: Select a set of desirable potential sites**
  - Hard infrastructure requirements
  - Soft infrastructure requirements
- **Phase IV: Location choices**

Models for Facility Location and Capacity Allocation

- Maximize the overall profitability of the supply chain network while providing customers with the appropriate responsiveness
- Many trade-offs during network design
- Network design models used to decide on locations and capacities and to assign current demand to facilities

Models for Facility Location and Capacity Allocation

- Important information
  - Location of supply sources and markets
  - Location of potential facility sites
  - Demand forecast by market
  - Facility, labor, and material costs by site
  - Transportation costs between each pair of sites
  - Inventory costs by site and as a function of quantity
  - Sale price of product in different regions
  - Taxes and tariffs
  - Desired response time and other service factors

Phase II: Network Optimization Models

	A	B	C	D	E	F	G	H	I	J
1	***Inputs - Costs, Capacities, Demands***									
2		*Demand Region* *Production and Transportation Cost per 1,000,000 Units*					**Fixed**	**Low**	**Fixed**	**High**
3	*Supply Region*	N. America	S. America	Europe	Asia	Africa	**Cost ($)**	**Capacity**	**Cost ($)**	**Capacity**
4	N. America	81	92	101	130	115	6,000	10	9,000	20
5	S. America	117	77	108	98	100	4,500	10	6,750	20
6	Europe	102	105	95	119	111	6,500	10	9,750	20
7	Asia	115	125	90	59	74	4,100	10	6,150	20
8	Africa	142	100	103	105	71	4,000	10	6,000	20
9	*Demand*	12	8	14	16	7				

Figure 5-3

Capacitated Plant Location Model

n = number of potential plant locations/capacity

m = number of markets or demand points

D_j = annual demand from market j

K_i = potential capacity of plant i

f_i = annualized fixed cost of keeping plant i open

c_{ij} = cost of producing and shipping one unit from plant i to market j (cost includes production, inventory, transportation, and tariffs)

y_i = 1 if plant i is open, 0 otherwise

x_{ij} = quantity shipped from plant i to market j

$$Min \sum_{i=1}^{n} f_i y_i + \sum_{i=1}^{n} \sum_{j=1}^{m} c_{ij} x_{ij}$$

subject to

$$\sum_{i=1}^{n} x_{ij} = D_j \quad \text{for } j = 1,\ldots,m$$

$$\sum_{j=1}^{m} x_{ij} = K_i y_i \quad \text{for } i = 1,\ldots,n$$

$$y_i \in \{0,1\} \quad \text{for } i = 1,\ldots,n, x_{ij} \geq 0$$

Capacitated Plant Location Model

	A	B	C	D	E	F	G	H	I	J
1	***Inputs - Costs, Capacities, Demands***									
2		*Demand Region Production and Transportation Cost per 1,000,000 Units*					**Fixed**	**Low**	**Fixed**	**High**
3	*Supply Region*	N. America	S. America	Europe	Asia	Africa	**Cost ($)**	**Capacity**	**Cost ($)**	**Capacity**
4	N. America	81	92	101	130	115	6,000	10	9,000	20
5	S. America	117	77	108	98	100	4,500	10	6,750	20
6	Europe	102	105	95	119	111	6,500	10	9,750	20
7	Asia	115	125	90	59	74	4,100	10	6,150	20
8	Africa	142	100	103	105	71	4,000	10	6,000	20
9	*Demand*	12	8	14	16	7				
10										
11	***Decision Variables***									
12		*Demand Region - Production Allocation (Million Units)*					Plants	Plants		
13	*Supply Region*	N. America	S. America	Europe	Asia	Africa	(1=open)	(1=open)		
14	N. America	0	0	0	0	0	0	0		
15	S. America	0	0	0	0	0	0	0		
16	Europe	0	0	0	0	0	0	0		
17	Asia	0	0	0	0	0	0	0		
18	Africa	0	0	0	0	0	0	0		

Figure 5-4

Capacitated Plant Location Model

Inputs - Costs, Capacities, Demands

Supply Region	N. America	S. America	Europe	Asia	Africa	Fixed Cost ($)	Low Capacity	Fixed Cost ($)	High Capacity
	Demand Region								
	Production and Transportation Cost per 1,000,000 Units								
N. America	81	92	101	130	115	6,000	10	9,000	20
S. America	117	77	108	98	100	4,500	10	6,750	20
Europe	102	105	95	119	111	6,500	10	9,750	20
Asia	115	125	90	59	74	4,100	10	6,150	20
Africa	142	100	103	105	71	4,000	10	6,000	20
Demand	12	8	14	16	7				

Decision Variables

Supply Region	N. America	S. America	Europe	Asia	Africa	Plants (1=open)	Plants (1=open)
	Demand Region - Production Allocation (Million Units)						
N. America	0	0	0	0	0	0	0
S. America	0	0	0	0	0	0	0
Europe	0	0	0	0	0	0	0
Asia	0	0	0	0	0	0	0
Africa	0	0	0	0	0	0	0

Constraints

Supply Region	*Excess Capacity*
N. America	0
S. America	0
Europe	0
Asia	0
Africa	0

	N. America	S. America	Europe	Asia	Africa
Unmet Demand	12	8	14	16	7

Objective Function

Cost =	$ -

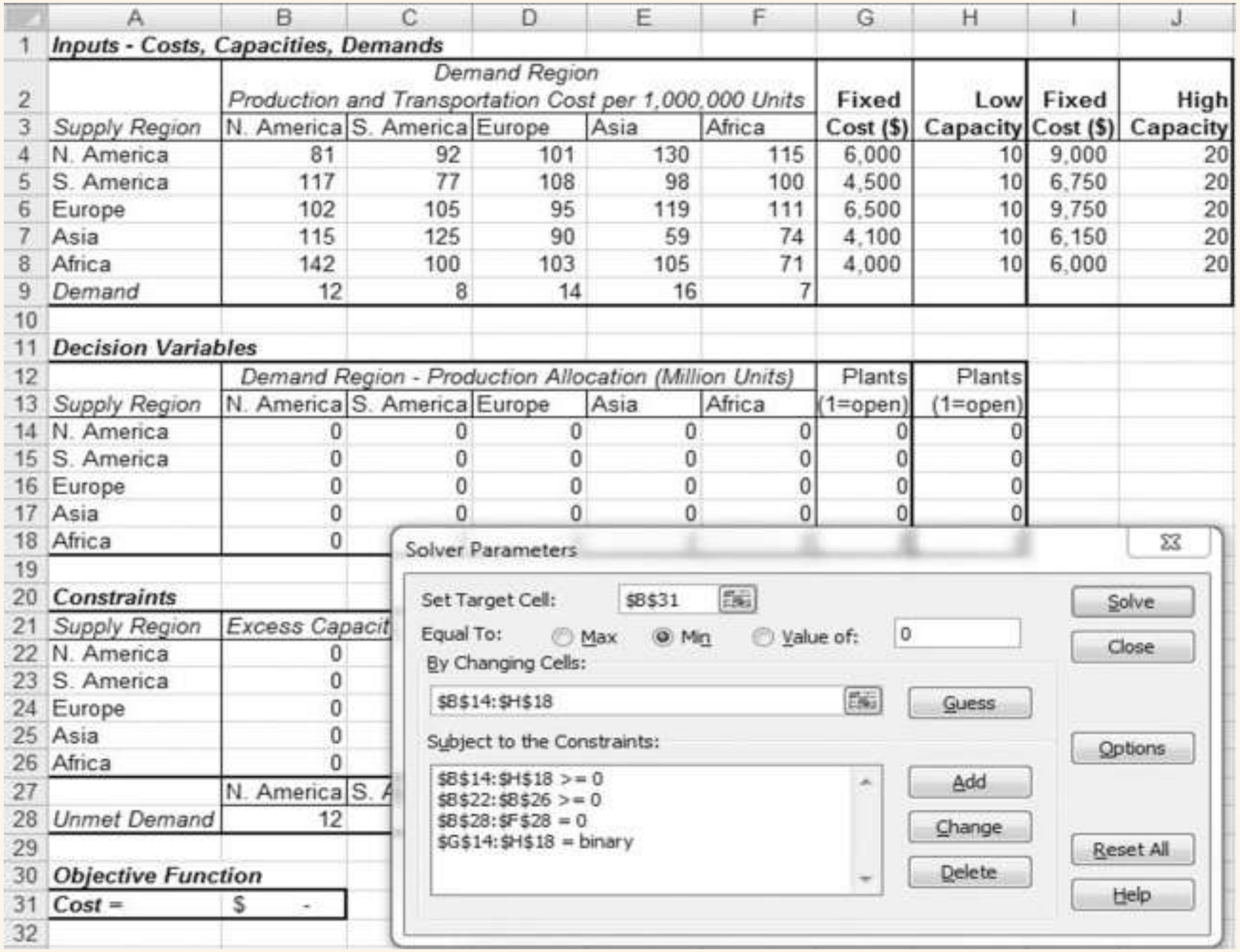
Figure 5-5

Capacitated Plant Location Model

Cell	Cell Formula	Equation	Copied to
B28	=B9 - SUM(B14:B18)	5.1	B28:F28
B22	=G14*H4 + H14*J4 - SUM(B14:F14)	5.2	B22:B26
B31	=SUMPRODUCT(B14:F18,B4:F8) + SUMPRODUCT(G14:G18,G4:G8) + SUMPRODUCT(H14:H18,I4:I8)	Objective Function	—

Figure 5-5

Phase III: Gravity Location Models



	A	B	C	D	E	F	G	H	I	J
1	*Inputs - Costs, Capacities, Demands*									
2		*Demand Region Production and Transportation Cost per 1,000,000 Units*					Fixed	Low	Fixed	High
3	*Supply Region*	N. America	S. America	Europe	Asia	Africa	Cost ($)	Capacity	Cost ($)	Capacity
4	N. America	81	92	101	130	115	6,000	10	9,000	20
5	S. America	117	77	108	98	100	4,500	10	6,750	20
6	Europe	102	105	95	119	111	6,500	10	9,750	20
7	Asia	115	125	90	59	74	4,100	10	6,150	20
8	Africa	142	100	103	105	71	4,000	10	6,000	20
9	*Demand*	12	8	14	16	7				
10										
11	*Decision Variables*									
12		*Demand Region - Production Allocation (Million Units)*					Plants	Plants		
13	*Supply Region*	N. America	S. America	Europe	Asia	Africa	(1=open)	(1=open)		
14	N. America	0	0	0	0	0	0	0		
15	S. America	0	0	0	0	0	0	0		
16	Europe	0	0	0	0	0	0	0		
17	Asia	0	0	0	0	0	0	0		
18	Africa	0								
19										
20	*Constraints*									
21	*Supply Region*	*Excess Capacit*								
22	N. America	0								
23	S. America	0								
24	Europe	0								
25	Asia	0								
26	Africa	0								
27		N. America	S. A							
28	*Unmet Demand*	12								
29										
30	*Objective Function*									
31	*Cost =*	$ -								
32										

Figure 5-6

Gravity Location Model

x_n, y_n: Coordinate location of either a market or supply source n

F_n: Cost of shipping one unit for one mile between the facility and either market or supply source n

D_n: Quantity to be shipped between facility and market or supply source n

(x, y) is the location selected for the facility, the distance d_n between the facility at location (x, y) and the supply source or market n is given by

$$d_n = \sqrt{(x - x_n)^2 + (y - y_n)^2}$$

Gravity Location Model

Inputs - Costs, Capacities, Demands

	Demand Region – Production and Transportation Cost per 1,000,000 Units								
Supply Region	N. America	S. America	Europe	Asia	Africa	**Fixed Cost ($)**	**Low Capacity**	**Fixed Cost ($)**	**High Capacity**
N. America	81	92	101	130	115	6,000	10	9,000	20
S. America	117	77	108	98	100	4,500	10	6,750	20
Europe	102	105	95	119	111	6,500	10	9,750	20
Asia	115	125	90	59	74	4,100	10	6,150	20
Africa	142	100	103	105	71	4,000	10	6,000	20
Demand	12	8	14	16	7				

Decision Variables

	Demand Region - Production Allocation (Million Units)					Plants	Plants
Supply Region	N. America	S. America	Europe	Asia	Africa	(1=open)	(1=open)
N. America	0	0	0	0	0	0	0
S. America	12	8	0	0	0	0	1
Europe	0	0	0	0	0	0	0
Asia	0	0	4	16	0	0	1
Africa	0	0	10	0	7	0	1

Constraints

Supply Region	*Excess Capacity*
N. America	0
S. America	0
Europe	0
Asia	0
Africa	3

	N. America	S. America	Europe	Asia	Africa
Unmet Demand	0	0	0	0	0

Objective Function

Cost =	$ 23,751

Figure 5-7

Gravity Location Model

Sources/Markets	Transportation Cost \$/Ton Mile (F_n)	Quantity in Tons (D_n)	Coordinates	
			x_n	y_n
Supply sources				
Buffalo	0.90	500	700	1,200
Memphis	0.95	300	250	600
St. Louis	0.85	700	225	825
Markets				
Atlanta	1.50	225	600	500
Boston	1.50	150	1,050	1,200
Jacksonville	1.50	250	800	300
Philadelphia	1.50	175	925	975
New York	1.50	300	1,000	1,080

Total transportation cost $TC = \sum_{n=1}^{k} d_n D_n F_n$

Table 5-1

Gravity Location Model

	Sources/ Markets	$/Ton Mile F_n	Tons D_n	Coordinates x_n	y_n	d_n
Sources	Buffalo	0.90	500	700	1200	1389
	Memphis	0.95	300	250	600	650
	St. Louis	0.85	700	225	825	855
Markets	Atlanta	1.50	225	600	500	781
	Boston	1.50	150	1050	1200	1595
	Jacksonville	1.50	250	800	300	854
	Philadelphia	1.50	175	925	975	1344
	New York	1.50	300	1000	1080	1472

Facility Location

x =	0.0
y =	0.0
Cost =	$3,277,110

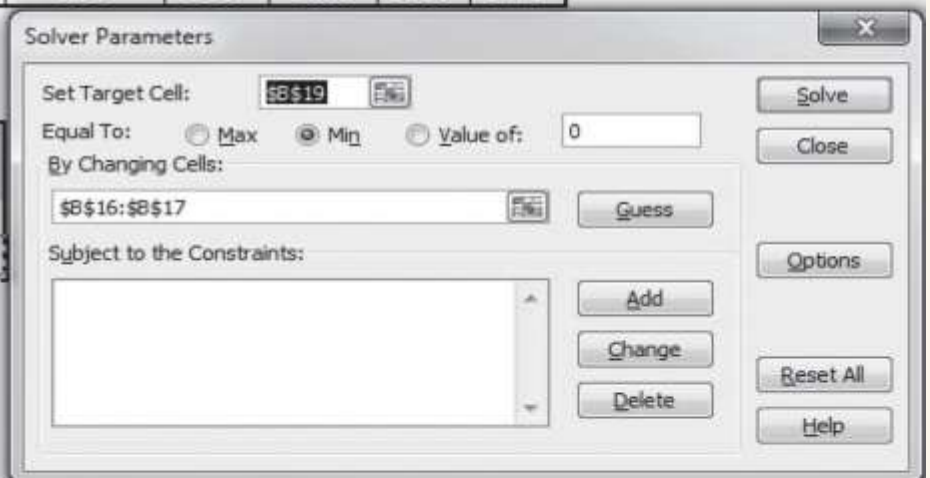


Figure 5-8

Gravity Location Model

Cell	Cell Formula	Equation	Copied to
G5	=SQRT((B16-E5)^2+(B17-F5)^2)	5.1	G5:G12
B19	=SUMPRODUCT(G5:G12,D5:D12,C5:C12)	5.2	—

Figure 5-8

Gravity Location Model

- For each supply source or market n, evaluate d_n
- Obtain a new location (x', y') for the facility, where

$$x' = \frac{\sum_{n=1}^{k} \frac{D_n F_n x_n}{d_n}}{\sum_{n=1}^{k} \frac{D_n F_n}{d_n}} \quad \text{and} \quad y' = \frac{\sum_{n=1}^{k} \frac{D_n F_n y_n}{d_n}}{\sum_{n=1}^{k} \frac{D_n F_n}{d_n}}$$

- If the new location (x', y') is almost the same as (x, y) stop. Otherwise, set $(x, y) = (x', y')$ and go to step 1

Phase IV: Network Optimization Models

Supply City	Demand City Production and Transportation Cost per Thousand Units (Thousand $) Atlanta	Boston	Chicago	Denver	Omaha	Portland	Monthly Capacity (Thousand Units) *K*	Monthly Fixed Cost (Thousand $) *f*
Baltimore	1,675	400	985	1,630	1,160	2,800	18	7,650
Cheyenne	1,460	1,940	970	100	495	1,200	24	3,500
Salt Lake City	1,925	2,400	1,450	500	950	800	27	5,000
Memphis	380	1,355	543	1,045	665	2,321	22	4,100
Wichita	922	1,646	700	508	311	1,797	31	2,200
Monthly demand (thousand units) D_j	10	8	14	6	7	11		

Table 5-2

Network Optimization Models

- Allocating demand to production facilities

n = Number of factory locations

m = Number of markets or demand points

D_j = Annual demand from market j

K_i = Capacity of factory i

c_{ij} = Cost of producing and shipping one unit from factory i to market j

x_{ij} = Quantity shipped from factory i to market j

$$Min \sum_{i=1}^{n} \sum_{j=1}^{m} c_{ij} x_{ij}$$

subject to

$$\sum_{i=1}^{n} x_{ij} = D_j \text{ for } j = 1, \ldots, m$$

$$\sum_{j=1}^{m} x_{ij} = K_i \text{ for } i = 1, \ldots, n$$

Network Optimization Models

- Optimal demand allocation

		Atlanta	Boston	Chicago	Denver	Omaha	Portland
TelecomOne	Baltimore	0	8	2			
	Memphis	10	0	12			
	Wichita	0	0	0			
HighOptic	Salt Lake				0	0	11
	Cheyenne				6	7	0

Table 5-3

Capacitated Plant Location Model

- Merge the companies
- Solve using location-specific costs

y_i = 1 if factory *i* is open, 0 otherwise

x_{ij} = quantity shipped from factory *i* to market *j*

$$Min \sum_{i=1}^{n} f_i y_i + \sum_{i=1}^{n} \sum_{j=1}^{m} c_{ij} x_{ij}$$

Capacitated Plant Location Model

	A	B	C	D	E	F	G	H	I
1	***Inputs - Costs, Capacities, Demands (for TelecomOptic)***								
2		*Demand City Production and Transportation Cost per 1000 Units*						**Fixed**	
3	*Supply City*	Atlanta	Boston	Chicago	Denver	Omaha	Portland	**Cost ($)**	**Capacity**
4	Baltimore	1,675	400	685	1,630	1,160	2,800	7,650	18
5	Cheyenne	1,460	1,940	970	100	495	1,200	3,500	24
6	Salt Lake	1,925	2,400	1,425	500	950	800	5,000	27
7	Memphis	380	1,355	543	1,045	665	2,321	4,100	22
8	Wichita	922	1,646	700	508	311	1,797	2,200	31
9	*Demand*	10	8	14	6	7	11		
11	***Decision Variables***								
12		*Demand City - Production Allocation (1000 Units)*						**Plants**	
13	*Supply City*	Atlanta	Boston	Chicago	Denver	Omaha	Portland	(1=open)	
14	Baltimore	0	0	0	0	0	0	0	
15	Cheyenne	0	0	0	0	0	0	0	
16	Salt Lake	0	0	0	0	0	0	0	
17	Memphis	0	0	0	0	0	0	0	
18	Wichita	0	0	0	0	0	0	0	

Figure 5-9

Capacitated Plant Location Model

Inputs - Costs, Capacities, Demands (for TelecomOptic)

Supply City	*Demand City — Production and Transportation Cost per 1000 Units* Atlanta	Boston	Chicago	Denver	Omaha	Portland	Fixed Cost ($)	Capacity
Baltimore	1,675	400	685	1,630	1,160	2,800	7,650	18
Cheyenne	1,460	1,940	970	100	495	1,200	3,500	24
Salt Lake	1,925	2,400	1,425	500	950	800	5,000	27
Memphis	380	1,355	543	1,045	665	2,321	4,100	22
Wichita	922	1,646	700	508	311	1,797	2,200	31
Demand	10	8	14	6	7	11		

Decision Variables

Supply City	*Demand City - Production Allocation (1000 Units)* Atlanta	Boston	Chicago	Denver	Omaha	Portland	Plants (1=open)
Baltimore	0	0	0	0	0	0	0
Cheyenne	0	0	0	0	0	0	0
Salt Lake	0	0	0	0	0	0	0
Memphis	0	0	0	0	0	0	0
Wichita	0	0	0	0	0	0	0

Constraints

Supply City	*Excess Capacity*
Baltimore	0
Cheyenne	0
Salt Lake	0
Memphis	0
Wichita	0

	Atlanta	Boston	Chicago	Denver	Omaha	Portland
Unmet Demand	10	8	14	6	7	11

Objective Function

Cost =	$ -

Figure 5-10

Capacitated Plant Location Model

Cell	Formula	Equation	Copied to
B22	= I4*H14 - SUM(B14:G14)	5.7	B23:B26
B29	= B9 - SUM(B14:B18)	5.6	C29:G29
B32	= SUMPRODUCT(B4:G8, B14:G18) + SUMPRODUCT(H4:H8, H14:H18)	Objective function	—

Figure 5-10

Capacitated Plant Location Model

Inputs - Costs, Capacities, Demands (for TelecomOptic)

Supply City	Atlanta	Boston	Chicago	Denver	Omaha	Portland	Fixed Cost ($)	Capacity
	Demand City – Production and Transportation Cost per 1000 Units							
Baltimore	1,675	400	685	1,630	1,160	2,800	7,650	18
Cheyenne	1,460	1,940	970	100	495	1,200	3,500	24
Salt Lake	1,925	2,400	1,425	500	950	800	5,000	27
Memphis	380	1,355	543	1,045	665	2,321	4,100	22
Wichita	922	1,646	700	508	311	1,797	2,200	31
Demand	10	8	14	6	7	11		

Decision Variables

Supply City	Atlanta	Boston	Chicago	Denver	Omaha	Portland	Plants (1=open)
	Demand City - Production Allocation (1000 Units)						
Baltimore	0	0	0	0	0	0	0
Cheyenne	0	0	0	0	0	0	0
Salt Lake	0	0	0	0	0	0	0
Memphis	0	0	0	0	0	0	0
Wichita	0	0	0	0	0	0	0

Constraints

Supply City	*Excess Capacity*
Baltimore	0
Cheyenne	0
Salt Lake	0
Memphis	0
Wichita	0

	Atlanta	Boston	Chicago	Denver	Omaha	Portland
Unmet Demand	10	8	14	6	7	11

Objective Function

Cost =	$ -

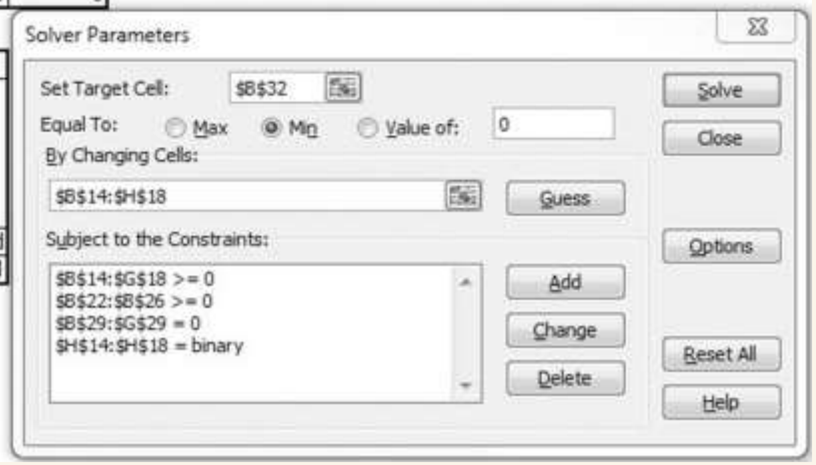


Figure 5-11

Capacitated Model with Single Sourcing

- Market supplied by only one factory
- Modify decision variables

$y_i = 1$ if factory i is open, 0 otherwise

$x_{ij} = 1$ if market j is supplied by factory i, 0 otherwise

$$Min \sum_{i=1}^{n} f_i y_i + \sum_{i=1}^{n} \sum_{j=1}^{m} D_j c_{ij} x_{ij}$$

subject to

$$\sum_{i=1}^{n} x_{ij} = 1 \text{ for } j = 1,\dots,m$$

$$\sum_{j=1}^{m} D_i x_{ij} \le K_i y_i \text{ for } i = 1,\dots,n$$

$$x_{ij}, y_i \in \{0,1\}$$

Capacitated Model with Single Sourcing

Inputs - Costs, Capacities, Demands (for TelecomOptic)

Supply City	Demand City: Production and Transportation Cost per 1000 Units — Atlanta	Boston	Chicago	Denver	Omaha	Portland	Fixed Cost ($)	Capacity
Baltimore	1,675	400	685	1,630	1,160	2,800	7,650	18
Cheyenne	1,460	1,940	970	100	495	1,200	3,500	24
Salt Lake	1,925	2,400	1,425	500	950	800	5,000	27
Memphis	380	1,355	543	1,045	665	2,321	4,100	22
Wichita	922	1,646	700	508	311	1,797	2,200	31
Demand	10	8	14	6	7	11		

Decision Variables

Supply City	Demand City - Production Allocation (1000 Units) — Atlanta	Boston	Chicago	Denver	Omaha	Portland	Plants (1=open)
Baltimore	0	8	2	0	0	0	1
Cheyenne	0	0	0	6	7	11	1
Salt Lake	0	0	0	0	0	0	0
Memphis	10	0	12	0	0	0	1
Wichita	0	0	0	0	0	0	0

Constraints

Supply City	Excess Capacity
Baltimore	8
Cheyenne	0
Salt Lake	0
Memphis	0
Wichita	0

	Atlanta	Boston	Chicago	Denver	Omaha	Portland
Unmet Demand	0	0	0	0	0	0

Objective Function

Cost =	$ 47,401

Figure 5-12

Capacitated Model with Single Sourcing

- Optimal network configuration with single sourcing

	Open/ Closed	Atlanta	Boston	Chicago	Denver	Omaha	Portland
Baltimore	Closed	0	0	0	0	0	0
Cheyenne	Closed	0	0	0	0	0	0
Salt Lake	Open	0	0	0	6	0	11
Memphis	Open	10	8	0	0	0	0
Wichita	Open	0	0	14	0	7	0

Table 5-4

Locating Plants and Warehouses Simultaneously

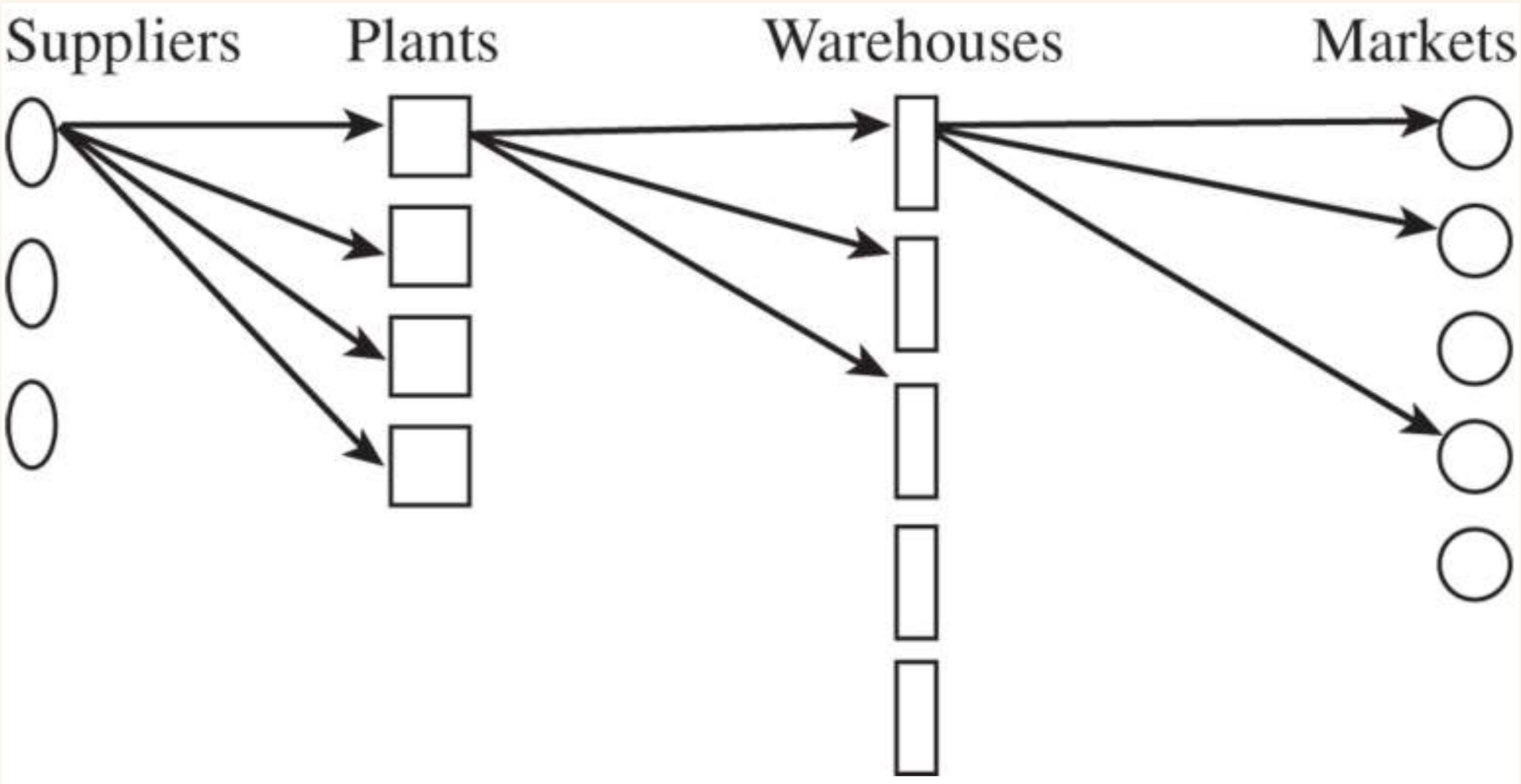


Figure 5-13

Locating Plants and Warehouses Simultaneously

- Model inputs

m = Number of markets or demand points
n = Number of potential factory locations
l = Number of suppliers
t = Number of potential warehouse locations
D_j = Annual demand from customer j
K_i = Potential capacity of factory at site i
S_h = Supply capacity at supplier h
W_e = Potential warehouse capacity at site e
F_i = Fixed cost of locating a plant at site i
f_e = Fixed cost of locating a warehouse at site e
c_{hi} = Cost of shipping one unit from supply source h to factory i
c_{ie} = Cost of producing and shipping one unit from factory i to warehouse e
c_{ej} = Cost of shipping one unit from warehouse e to customer j

Locating Plants and Warehouses Simultaneously

- Goal is to identify plant and warehouse locations and quantities shipped that minimize the total fixed and variable costs

Y_i = 1 if factory is located at site *i*, 0 otherwise

Y_e = 1 if warehouse is located at site *e*, 0 otherwise

x_{ej} = Quantity shipped from warehouse *e* to market *j*

x_{ie} = Quantity shipped from factory at site *i* to warehouse *e*

x_{hi} = Quantity shipped from supplier *h* to factory at site *i*

$$Min \sum_{i=1}^{n} F_i y_i + \sum_{e=1}^{t} f_e y_e + \sum_{h=1}^{l} \sum_{i=1}^{n} c_{hi} x_{ie} + \sum_{e=1}^{t} \sum_{j=1}^{m} c_{ej} x_{ej}$$

Locating Plants and Warehouses Simultaneously

subject to

$$\sum_{i=1}^{n} x_{hi} \le S_h \quad \text{for } h = 1,\ldots,l$$

$$\sum_{h=1}^{l} x_{hi} - \sum_{e=1}^{t} x_{ie} \ge 0 \quad \text{for } i = 1,\ldots,n$$

$$\sum_{e=1}^{t} x_{ie} \le K_i y_i \quad \text{for } i = 1,\ldots,n$$

$$\sum_{i=1}^{n} x_{ie} - \sum_{j=1}^{m} x_{ej} \ge 0 \quad \text{for } e = 1,\ldots,t$$

$$\sum_{j=1}^{m} x_{ej} \le W_e y_e \quad \text{for } e = 1,\ldots,t$$

$$\sum_{e=1}^{t} x_{ej} = D_j \quad \text{for } j = 1,\ldots,m$$

$$y_i, y_e \in \{0,1\}, x_{ej}, x_{ie}, x_{hi} \ge 0$$

Accounting for Taxes, Tariffs, and Customer Requirements

- A supply chain network should maximize profits after tariffs and taxes while meeting customer service requirements
- Modified objective and constraint

$$Max \sum_{j=1}^{m} r_j \sum_{i=1}^{n} x_{ij} - \sum_{i=1}^{n} F_i y_i - \sum_{i=1}^{n} \sum_{j=1}^{m} c_{ij} x_{ij}$$

$$\sum_{i=1}^{n} x_{ij} \le D_j \quad \text{for } j = 1, \ldots, m$$

Making Network Design Decisions in Practice

- Do not underestimate the life span of facilities
- Do not gloss over the cultural implications
- Do not ignore quality-of-life issues
- Focus on tariffs and tax incentives when locating facilities

Summary of Learning Objectives

- Understand the role of network design in a supply chain
- Identify factors influencing supply chain network design decisions
- Develop a framework for making network design decisions
- Use optimization for facility location and capacity allocation decisions