

Exercises

1. SC Consulting, a supply chain consulting firm, must decide on the location of its home offices. Its clients are located primarily in the 16 states listed in Table 5-5. There are four potential sites for home offices: Los Angeles, Tulsa, Denver, and Seattle. The annual fixed cost of locating an office in Los Angeles is \$165,428, Tulsa is \$131,230, Denver is \$140,000, and Seattle is \$145,000. The expected number of trips to each state and the travel costs from each potential site are shown in Table 5-5. Each consultant is expected to take at most 25 trips each year.
 - a. If there are no restrictions on the number of consultants at a site and the goal is to minimize costs, where should the home offices be located and how many consultants should be assigned to each office? What is the annual cost in terms of the facility and travel?
 - b. If 10 consultants are to be assigned to a home office, at most, where should the offices be set up? How many consultants should be assigned to each office? What is the annual cost of this network?
 - c. What do you think of a rule by which all consulting projects out of a given state are assigned to one home office? How much is this policy likely to add to cost compared to allowing multiple offices to handle a single state?
2. DryIce, Inc., is a manufacturer of air conditioners that has seen its demand grow significantly. The company anticipates nationwide demand for the next year to be 180,000 units in the South, 120,000 units in the Midwest, 110,000 units in the East, and 100,000 units in the West. Managers at DryIce are designing the manufacturing network and have selected four potential sites—New York, Atlanta, Chicago, and San Diego.

TABLE 5-5 Travel Costs and Number of Trips for SC Consulting

State	Travel Costs (\$)				Number of Trips
	Los Angeles	Tulsa	Denver	Seattle	
Washington	150	250	200	25	40
Oregon	150	250	200	75	35
California	75	200	150	125	100
Idaho	150	200	125	125	25
Nevada	100	200	125	150	40
Montana	175	175	125	125	25
Wyoming	150	175	100	150	50
Utah	150	150	100	200	30
Arizona	75	200	100	250	50
Colorado	150	125	25	250	65
New Mexico	125	125	75	300	40
North Dakota	300	200	150	200	30
South Dakota	300	175	125	200	20
Nebraska	250	100	125	250	30
Kansas	250	75	75	300	40
Oklahoma	250	25	125	300	55

• Network Design in the Supply Chain

TABLE 5-6 Production and Transport Costs for DryIce, Inc.

	New York	Atlanta	Chicago	San Diego
Annual fixed cost of 200,000 plant	\$6 million	\$5.5 million	\$5.6 million	\$6.1 million
Annual fixed cost of 400,000 plant	\$10 million	\$9.2 million	\$9.3 million	\$10.2 million
East	\$211	\$232	\$238	\$299
South	\$232	\$212	\$230	\$280
Midwest	\$240	\$230	\$215	\$270
West	\$300	\$280	\$270	\$225

TABLE 5-7 Capacity, Demand, Production, and Transportation Costs for Sunchem

	North America	Europe	Japan	South America	Asia	Capacity Tons/Year	Production Cost/Ton
United States	\$600	\$1,300	\$2,000	\$1,200	\$1,700	185	\$10,000
Germany	\$1,300	\$600	\$1,400	\$1,400	\$1,300	475	15,000 euro
Japan	\$2,000	\$1,400	\$300	\$2,100	\$900	50	1,800,000 yen
Brazil	\$1,200	\$1,400	\$2,100	\$800	\$2,100	200	13,000 real
India	\$2,200	\$1,300	\$1,000	\$2,300	\$800	80	400,000 rupees
Demand (tons/year)	270	200	120	190	100		

Plants could have a capacity of either 200,000 or 400,000 units. The annual fixed costs at the four locations are shown in Table 5-6, along with the cost of producing and shipping an air conditioner to each of the four markets. Where should DryIce build its factories and how large should they be?

3. Sunchem, a manufacturer of printing inks, has five manufacturing plants worldwide. Their locations and capacities are shown in Table 5-7 along with the cost of producing 1 ton of ink at each facility. The production costs are in the local currency of the country where the plant is located. The major markets for the inks are North America, South America, Europe, Japan, and the rest of Asia. Demand at each market is shown in Table 5-7. Transportation costs from each plant to each market in U.S. dollars are shown in Table 5-7. Management must come up with a production plan for the next year.
 - a. If exchange rates are expected as in Table 5-8, and no plant can run below 50 percent of capacity, how much should each plant produce and which markets should each plant supply?
 - b. If there are no limits on the amount produced in a plant, how much should each plant produce?

- c. Can adding 10 tons of capacity in any plant reduce costs?
- d. How should Sunchem account for the fact that exchange rates fluctuate over time?

TABLE 5-8 Anticipated Exchange Rates for the Next Year

	US\$	Euro	Yen	Real	Rupee
US\$	1.000	1.993	107.7	1.78	43.55
Euro	0.502	1	54.07	0.89	21.83
Yen	0.0093	0.0185	1	0.016	0.405
Real	0.562	1.124	60.65	1	24.52
Rupee	0.023	0.046	2.47	0.041	1