CHAPTER 5

Case Questions *(see corresponding Chapter 5 case Excel spreadsheet*)

1. What is the cost SportStuff.com incurs if all warehouses leased are in St. Louis?

Demand in 2007 is as shown in Table 5-15

|  |  |
| --- | --- |
|  | Demand 2007 |
| Northwest | 320,000 |
| Southwest | 200,000 |
| Upper Midwest | 160,000 |
| Lower Midwest | 220,000 |
| Northeast | 350,000 |
| Southeast | 175,000 |
| Total Demand | 1,425,000 |

The capacity of the current warehouse in St. Louis is 2,000,000 units per year, more than enough to accommodate 2007’s demand.

Costs are calculated as:

Fixed Warehouse Cost = $220,000

Variable Warehouse Cost = ($0.20/unit)(1,425,000 units) = $285,000

Holding Cost = $475,000+0.165\*1,425,000 = $710,125

Shipping Cost = $1,068,750

Shipping Recouped from Customer = (1,425,000/4)\*$3 = $1,068,750

Total Network Costs = $1,254,500

Note that the spreadsheet used for these calculations employed the linear holding cost function of $475,000+0.165F, which results in a holding cost of $710,125 and a total plan cost of $1,254,500.

Subsequent holding costs will use the single linear function to determine holding costs.

If demand increases by 80% per year for 2008, 2009, and 2010 and SportStuff.com wishes to use St. Louis as their only warehouse center, the following demands and costs are realized. The optimal solution for 2008 calls for one large warehouse rather than two small ones.

|  |  |
| --- | --- |
|  | Demand 2008 |
| Northwest | 576000 |
| Southwest | 360000 |
| Upper Midwest | 288000 |
| Lower Midwest | 396000 |
| Northeast | 630000 |
| Southeast | 315000 |
| Total Demand | 2,565,000 |

|  |  |
| --- | --- |
| Total Shipping Cost | $1,994,625 |
| Total Holding Cost | $898,225 |
| Warehouse Cost | $888,000 |
| Total Shipping Recoup | $1,923,750 |
|  |  |
| TOTAL COST | $1,857,100 |

For 2009, one small and one large warehouse is optimal.

|  |  |
| --- | --- |
|  | Demand 2009 |
| Northwest | 1036800 |
| Southwest | 648000 |
| Upper Midwest | 518400 |
| Lower Midwest | 712800 |
| Northeast | 1134000 |
| Southeast | 567000 |
| Total Demand | 4,617,000 |

|  |  |
| --- | --- |
| Total Shipping Cost | $3,590,325 |
| Total Holding Cost | $2,473,610 |
| Warehouse Cost | $1,518,400 |
| Total Shipping Recoup | $3,462,750 |
|  |  |
| TOTAL COST | $4,119,585 |

For 2010, one small and two large warehouses are optimal

|  |  |
| --- | --- |
|  | Demand 2010 |
| Northwest | 1866240 |
| Southwest | 1166400 |
| Upper Midwest | 933120 |
| Lower Midwest | 1283040 |
| Northeast | 2041200 |
| Southeast | 1020600 |
| Total Demand | 8,310,600 |

|  |  |
| --- | --- |
| Total Shipping Cost | $6,462,585 |
| Total Holding Cost | $5,538,747 |
| Warehouse Cost | $2,632,120 |
| Total Shipping Recoup | $6,232,950 |
|  |  |
| TOTAL COST | $8,400,502 |

1. What supply chain network configuration do you recommend for SportStuff.com?

The progression if location is not restricted to St. Louis is as follows:

For 2008: Small warehouses in Seattle and St. Louis

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Northwest | Southwest | Upper Midwest | Lower Midwest | Northeast | Southeast | Total Supply |
| Seattle | 576,000 | 360,000 | 0 | 0 | 0 | 0 | 936,000 |
| Denver | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| St. Louis | 0 | 0 | 288,000 | 396,000 | 630,000 | 315,000 | 1,629,000 |
| Atlanta | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Philadelphia | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Demand | 576,000 | 360,000 | 288,000 | 396,000 | 630,000 | 315,000 |  |

|  |  |
| --- | --- |
| Total Shipping Cost | $1,688,625 |
| Total Holding Cost | $1,373,225 |
| Warehouse Cost | $1,033,000 |
| Total Shipping Chg | $1,923,750 |
|  |  |
| TOTAL COST | $2,171,100 |

A lower total system cost is achievable if SportStuff abandons their small St. Louis warehouse and opts for a single large warehouse in Atlanta.

|  |  |
| --- | --- |
| Total Shipping Cost | $2,068,875 |
| Total Holding Cost | $898,225 |
| Warehouse Cost | $888,000 |
| Total Shipping Chg | $1,923,750 |
|  |  |
| TOTAL COST | $1,931,350 |

For 2009: Small warehouses in Seattle and St. Louis plus a small warehouse in Atlanta

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Northwest | Southwest | Upper Midwest | Lower Midwest | Northeast | Southeast | Total Supply |
| Seattle | 1,036,800 | 648,000 | 0 | 0 | 0 | 0 | 1,684,800 |
| Denver | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| St. Louis | 0 | 0 | 518,400 | 497,096 | 984,504 | 0 | 2,000,000 |
| Atlanta | 0 | 0 | 0 | 215,704 | 149,496 | 567,000 | 932,200 |
| Philadelphia | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Demand | 1,036,800 | 648,000 | 518,400 | 712,800 | 1,134,000 | 567,000 |  |

|  |  |
| --- | --- |
| Total Shipping Cost | $2,897,775 |
| Total Holding Cost | $2,186,805 |
| Warehouse Cost | $1,663,400 |
| Total Shipping Chg | $3,462,750 |
|  |  |
| TOTAL COST | $3,285,230 |

For 2010, Small warehouses in all cities results in

|  |  |
| --- | --- |
| Total Shipping Cost | $4,965,995 |
| Total Holding Cost | $3,746,249 |
| Warehouse Cost | $2,892,120 |
| Total Shipping Chg | $6,232,950 |
|  |  |
| TOTAL COST | $5,371,414 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Northwest | Southwest | Upper Midwest | Lower Midwest | Northeast | Southeast | Total Supply |
| Seattle | 1,866,240 | 116,640 | 0 | 0 | 0 | 0 | 1,982,880 |
| Denver | 0 | 1,049,760 | 933,120 | 0 | 0 | 0 | 1,982,880 |
| St. Louis | 0 | 0 | 0 | 1,283,040 | 41,200 | 0 | 1,324,240 |
| Atlanta | 0 | 0 | 0 | 0 | 0 | 1,020,600 | 1,020,600 |
| Philadelphia | 0 | 0 | 0 | 0 | 2,000,000 | 0 | 2,000,000 |
| Total Demand | 1,866,240 | 1,166,400 | 933,120 | 1,283,040 | 2,041,200 | 1,020,600 |  |

A lower cost solution of small warehouses in Seattle and Atlanta and large warehouses in Denver and Philadelphia results in a savings of $248,018.

|  |  |
| --- | --- |
| Total Shipping Cost | $5,082,976 |
| Total Holding Cost | $3,271,249 |
| Warehouse Cost | $3,002,120 |
| Total Shipping Chg | $6,232,950 |
|  |  |
| TOTAL COST | $5,123,395 |