Mark S. Daskin
Summer, 2010
Department of Industrial and Operations Engineering
University of Michigan

SITATION Data Requirements

Basic demand node data

- **Node number** (nodes should probably be numbered sequentially from 1)
- **Longitude**
- **Latitude**
- **Demand 1** (items per day)
- **Demand 2** (some other measure of demand is allowed; otherwise duplicate demand 1)
- **Fixed cost** of locating a distribution center at the node. This should be the annualized cost.
- **Name** of the node (alphanumeric identifier)*

Other node data *(note that this information is completely optional. It is to be used if there are additional non-demand node candidate locations.)**

- Same data as for demand nodes; note that the demand information is ignored for these nodes and can be set to 0

Distance data

- **Distances** between every pair of nodes. *If not supplied this can be computed using (a) great circle distances – as the crow flies; (b) Euclidean distances – straight line distances on a plane; (c) Manhattan distances – right angle distances used in some cites.*
- **Coverage distance** (this is a distance standard that is useful in evaluating the quality of a solution and is required for some forms of optimization. It is not absolutely needed for the model to run since any reasonable value can be used.)*

Additional data needed to run the SCD model

- **Lead time** in days for deliveries from the plant(s) to the distribution centers. At present this can only be one number and cannot depend on the identity of the plant or the distribution center
- **Variance to mean** ratio for the demand data. This is likely to be a number less than or equal to 1.
- **Service level** or $\mathbf{z_\alpha}$ the critical value on the Normal distribution. Thus, if we want to be 97.5% sure that there will be enough inventory on hand when a demand is registered, then $z_\alpha = 1.96$.
- **Unit holding cost** per item per year.
- **Fixed order cost** at a distribution center. This gives how much it costs per order to place an order to the plant.
- **Transport cost weight**. This can be used to place more or less emphasis on the transportation cost components of the cost function. It is likely to be set to 1 if other cost components are set appropriately.
- **Inventory cost weight**. This can be used to place more or less emphasis on the inventory cost components of the cost function. It is likely to be set to 1 if other cost components are set appropriately.
- **Dollars per demand-mile** in local delivery operations. This is used to calibrate the cost of local deliveries from the distribution center to the retailers. It can be estimated by dividing the total annual cost of delivering to all retailers by the product of the number of units delivered each year and the total number of miles driven in local delivery operations.
- **Days per year**. This is useful to convert the daily demand into annual demand.
- **Plant locations**. These must be among the demand locations or the other node locations.
- **Cost parameters (*A, B, C, D* in the equation below) for shipments from the plant(s) to the distribution centers**. These costs are computed as:

  Cost per shipment to a DC = ***A*** + ***B*** (Distance to DC)
  + ***C*** (Demand)
  + ***D*** (Demand*Distance to DC)