

Big Depot Hurricane Planning Game

1 Introduction

Big Depot is a retailer of appliances, furniture, and general home improvement products. During the hurricane season, the firm aims to efficiently provide products required by the stores during the pre-strike and post-strike phases in an accurate and timely manner. The Disaster Management Team (DMT) is in charge of planning Big Depot's supply chain operations during the disaster preparedness and response phases.

The DMT has to decide how many units of each group of products highly demanded during the hurricane season should be reserved and paid in advance through contracts with their vendors. Also, the DMT has to decide how the reserved inventory should be allocated among Big Depot's four regional warehouses. The DMT expects that with adequate pre-purchasing and proper allocation of the products, total procurement and inventory re-allocation transportation costs are minimized.

2 Background

Big Depot is a company committed to respond to the communities it does business with after they are hit by a disaster such as a hurricane, by staying in operation and offering products according to the pre-strike and post-strike needs of the community. A sample set of key products is listed and grouped as follows:

- ❖ Cover set: blue tarp, plastic sheeting, etc.
- ❖ Lightening set: batteries, spotlight, flashlights, etc.
- ❖ Generators
- ❖ Bottled water
- ❖ Recovery set: rope, ladder, extensions cords, rakes, shovels, scoops, etc.
- ❖ Cleanup set: cleanup products, sponges, brushes, towels, mops, brooms, buckets, trash cans, trash bags, etc.

Big Depot's vendors for pre-strike and post-strike items offer the company discounted prices when the company reserves these items and pays them in advance, i.e. before the storm strikes. When Big Depot reserves and pays for products in advance, vendors ship the reserved items to Big Depot's four regional distribution centers (DCs), according to DMT's allocation

decisions. Then, a few days before or right after a hurricane strikes, these items are shipped from the DCs to the Big Depot stores within the area. *If the stores' demand exceeds the regional warehouse inventory, the stores meet the unfulfilled demand paying higher prices to vendors for the expedited delivery of the required products.* These prices are higher than the discounted prices since expedited transportation is more expensive, limited supply of required products after a disaster strikes may cause prices to raise, and it is easier for vendors to plan their processes when demand is known, which allows them to execute their supply processes more efficiently. Nevertheless, Big Depot has an inventory policy that limits company's working capital; therefore, *the DMT has a limited budget for the advance orders*; hence, the budget cannot be exceeded when making their purchasing contracts.

Additionally, lead times when shipping from company's regional DCs to stores are shorter than when the supplies are shipped directly from the vendors. For instance, pre-loaded trailers can be dispatched from DCs to stores right after a storm strikes. Given that usually more than one region is affected during the hurricane season, the reserved inventory for the hurricane season is usually allocated in more than one regional DC. *Big Depot's fairness policy is that all regions should be served equally.* This is why Big Depot's DMT seeks to allocate the reserved inventory to each warehouse proportionally to the projected demand of the region, such that the expected portion of demand fulfilled directly from the regional DC opposed to from vendors by expediting shipping is the same for all regions. *For example, if 25% of the demand is projected to be located in one DC, then 25% of the reserved inventory should be allocated to that DC.* Demand locations are projected based on the hurricane path. Once the hurricane path is known, the reserved items might be required to be re-allocated before the storm strikes in order to maintain a fair inventory distribution among the regions according to the latest information, incurring an additional transportation cost.

You just have been hired as the Big Depot's new DMT. Therefore, you will make recommendations on the reservation quantities for each group of items and the allocation of these items among Big Depot's DCs for the next season.