BIA 650 A Homework#6 W&A Chapter 5, Problem 67

# Management Overview

Problem Statement:

The Objective is to minimize the sum of Total Cost and Shipping Cost

Data Sources:

* + The **inputs** are identified as Cost of Shipping one unit from each Warehouse to each Customer, Demand from each Customer, Penalty Costs and Number of Units available in each warehouse.
  + The key **decision variable** is the amount to be shipped to each customer from each warehouse.
  + **Constraints** are as follows
    - The total amount shipped from the warehouse should be equal to the amount available.
    - The decision variable should be an Integer.
  + **Output** is the Total Cost incurred in shipping the goods from the Warehouses to the customers taking into account the penalty costs involved.

Model Approach:

* + Separate the data into inputs, decision variables, constraints and output and enter them on the spreadsheet. Total penalty costs incurred and Total shipping costs for each customer is calculated. The Inputs, Decision Variables, Constraints and objective cell to be minimized are added in Solver and it is run.

We select the GRG non-linear method here because there are linear dependencies in the problem that disqualify it as LP problem.

Sensitivity Analysis:

* **Total Cost VS WH2 Capacity**

The capacity of Warehouse 2 and Total Cost have a negative correlation. i.e. The Total Cost decreases as the Capacity of Warehouse increases.

* **Total Cost VS Unit Penalty Cost of Customer 3**

When the Unit penalty cost of Customer 3 changes from 0 to 50, there is a consistent increase in the total, beyond 50 the Total Cost stays the same at 3000$

Solution: The Optimal solution is to ship 10 units and 30 units from Warehouse 1 to customers 2 and 3 respectively and to ship all the units in Warehouse 2 to Customer 1.