**Problem**: Minimize Motorola’s total purchase and administrative cost for buying 8 products from 5 suppliers given list price, discount and quantity

**Solution**: Build a linear integer model to minimize the total purchase and administrative cost under the given constraints on suppliers and products

**Inputs**: in blue in spreadsheet,

* For each product the list price and required quantity
* For each product, supplier the discount percentage
* For each supplier, $5,000 as the admin cost of setup for Motorola

**Objective function: Min** (**Total Purchase and Admin cost**) **=**

**)**, where

* **Xij** – Quantity of product i supplied by supplier j
* **Pi** – List price ($) of product i
* **Qi** – Quantity required (demand) of product i
* **Dij** – Discount (%) offered on product i by supplier j
* **Yj** – Binary variable to decide whether supplier j is selected or not (0,1)
* **Cj** – Fixed administrative cost ($) of setting up supplier j for Motorola (5000)
* **i (1…8)** for the 8 products
* **j (1…5)** for the 5 suppliers

**Decision variables**:

* **Xij** – Quantity of product i supplied by supplier j
* **Yj** – Binary variable to decide whether supplier j is selected or not

**Constraints**:

1. **Xij <= 0.8\*Qi,** asupplier cannot supply more than 80% of any products required quantity
2. **>= Qi for all i,** quantity supplied by all suppliers must meet demand for each product

* **Xij <= Yj \* M**, where **M (797)**
  + To ensure that product i is supplied by supplier j only when it is selected, which forces the model to incur the fixed administrative cost of setting up supplier j
  + **M – maximum quantity required among all products**
    - It could be any large no like 1,000 or 10,000, etc, but the result is the same
    - Smaller value will give sub-optimal result

1. **Xij  int,** only integer quantities must be supplied by each supplier
2. **Xij >= 0,** non-negativity constraint
3. **Yj (0,1),** as it is a binary decision variable
4. **>= 2,** we need at least 2 suppliers for each product as no supplier can supply more than 80% of each product quantity required

**Result**:

* Motorola’s **minimum total purchase and administrative cost** is **$ 243,550.52**