**Linear Programming: (Blending) ACC Cement**

A cement manufacturing company faces the problem to maximise the profit by optimising the blending of two qualities of silica. In this problem we have two qualities of silica (grade 5 and grade 9) which should be mixed in the right amount to achieve the right quality level of cements (OPC 43 and OPC 53). The company generates revenue by selling these two types of cement at different rates so it is really important to mix silica in right quantity and majorly it plays an important role in structural stability so blending in right quantity is really important. Also the revenue depends upon the variable cost for each type of cement.

**Discussion:**

Our objective here is to develop a linear programming model which helps blending in right amount of grade 5 and grade 9 silica to get the desired quality level of cement (OPC 43 and OPC 53). The quality level of OPC 43 must be at least 6 and for OPC 53 must be at least 8. So linear blending model helps us achieve that. And moreover each lb of silica used for preparing cement yields certain amount of revenue which depends upon variable cost (like labour cost -mixing, grinding cost and inventory cost), through which we can calculate the profit generated from the output using each lb of cement produced. Also for that month we have limited quantity of each grade of silica present which will act as constraint and impact the overall quantity of cement produced.

**Mathematical model:**

**Parameters:**

 i ∈ {1,2 : type of silica }, j ∈ {Type of grade cement: (OPC 43, OPC53)}

**Qi:** The quality level of type i silica

**Qj:** The quality level of grade j cement

**Rj:** The Revenue from 1lb of grade j cement

**Cj**: Cost for 1lb of silica to produce grade j of cement

**Ai**: Availabe quantity of type i silica

**Decision:**

**Xij :** Type i of silica used to produce grade j of cement

**Objective:** Maximize the profit

**Max Σi2Σj2 Xij \*( Rj- Cj)**

**Constraints:**

1. Xij ≥ 0 Non Negative constraint
2. Σj2 Xij ≤ Ai  Quantity of silica available
3. Σi2 Xij \* Qi ≥ Σi2 Xij \* Qj

