OPTOSTRAT

Country La-La-Land is suffering from drought and its effects are resulting in lack of food availability. With the aid of a few foreign countries the Home Country is able to procure its need for food and other essential needs. The Central Government decided to establish various Warehouses so as to meet the demand of all 19 states. The Financial Department of La-La-Land requested the Government to setup the Warehouses with least cost possible plan and optimal locations for the state and send the report to center.

The Government is trying to provide the basic need for the people, but due to limited resources planning has to be done carefully. The country has seeked help from P&S InfoTech which specializes in construction and logistics. The Government wants to meet all the necessary demand of the population by catering to all 19 states. (Please refer the Map)

The Government wants P&S InfoTech to establish **Large Warehouse (Distribution Center)** and **Small Warehouse (Fulfillment Center)** with following below mentioned conditions:

- Each **Fulfillment Center** will be established in a state which will cater to the needs of the people **in that State only**.
- The **Distribution Center** are larger and have infinite resource and can provide **back-up** and **additional** support to the needs of people.
- Each **Distribution Center can cater the demand of its own state and all the states adjacent to its own state**.
- Warehouses are expensive to setup and to maintain.
- There should be **at least one Large Warehouse (Distribution Center)** care centers to be opened overall.
- The Ministry wants to know **the minimum number** of warehouses with constraint that it will need to set up so that each district state can be catered keeping the budget optimum.
- All the cost is in 000's (thousands of $)
- There are Construction Cost for the **Distribution Center is $3000** per center respectively.
- There are Construction Cost for the **Fulfilment Center is $1000** per center respectively.
- For DISTRIBUTION CENTER, in order to cater their demand to neighboring/adjacent states, there are **Transportation Cost** incurred. They account for the total transportation cost for **cross border** transfer irrespective of number of states.
  For eg: if State 1 has DISTRIBUTION CENTER setup, then Transportation cost of State 1 to State 2 and State 1 to Sate 3 is $600 (total).
- Apart from this, for the vehicles to transport goods across state border there are **Taxes** which are to be paid for each neighboring/adjacent state respectively. The total taxes are calculated as;
  Total Taxes for State 'X' = 100 * No. of states adjacent to it.
  The taxes occur only in case of Big Warehouse only.
- These costs are **a part of Fixed Cost** which has to be calculated before construction of Warehouses.
- The **Variable Costs** which are to be borne later, are same irrespective of the type or location of Warehouse, thus are **not taken** into consideration.

- **The budget constraint with the state is $17000.**
- **NOTE: THIS IS NOT A CAPACITY OR DEMAND PLANNING PROBLEM. THE OBJECTIVE IS TO DETERMINE THE MINIMUM COST.**

The data for the states is given below:

State Number	Adjacent States	Transportation Cost (in 000's)
1	2,3	600
2	1,3,4	750
3	1,2,4,5	900
4	2,3,5,9	650
5	3,4,6,8,9	1500
6	5,7,8	700
7	6,8	800
8	5,6,7,9,14,15	1900
9	4,5,8,10,14	1650
10	9,11,14	800
11	10,12,13,14	1000
12	11,13,17,19	1100
13	11,12,14,16,17	1600
14	8,9,10,11,13,15,16	1900
15	8,14,16	800
16	13,14,15,17,18	1300
17	12,13,16,18,19	1400
18	16,17	750
19	12,17	950

Instructions:

- **The participants are allowed to allocate a counter as 0 or 1 in the given simulation for Big Warehouse and Small Warehouse.**
- **Use DROP DOWN Box to insert values**
- **But if the participants decides to change the counter, For eg: if '1' is allotted in the box for Big Warehouse corresponding to state 1; and you decide to put a small warehouse corresponding to state 1, you need to change the counter corresponding to Big Warehouse as '0' first.**
  Similar process has to be repeated corresponding to each big warehouse in case a small warehouse has to be allotted at any position.

Steps:

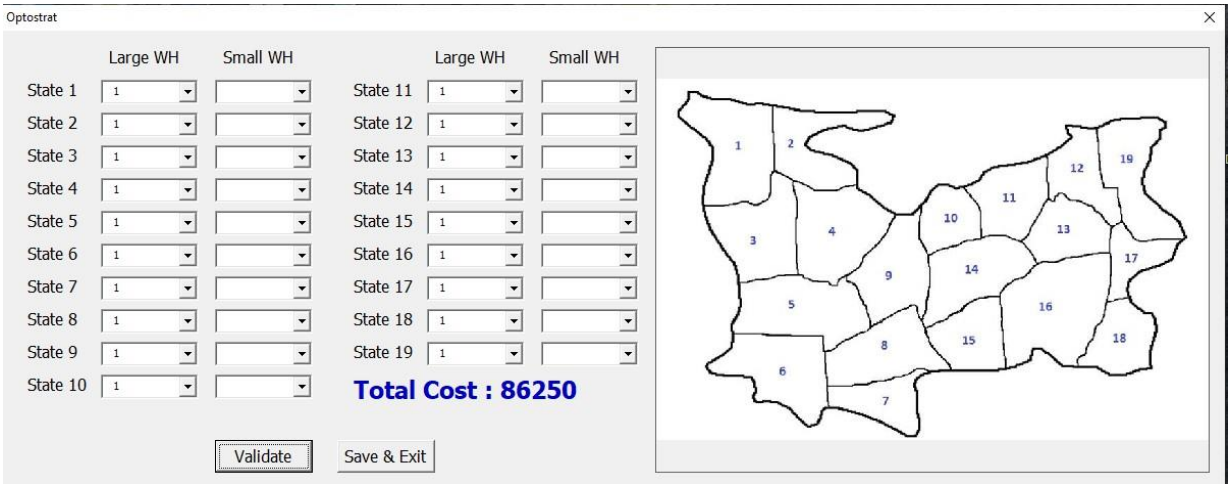
1. **Make the counter corresponding to Big Warehouses '0' when there is a common catering happening.**
2. **Change the counter of Small Warehouse according to your requirement.**

3. **Similar process has to be repeated if you have allotted a value at corresponding Small Warehouse and you wish to make changes for big warehouse.**

There is an attached word document which shows the steps for reference.

NOTE:

- **If the states are <u>not catered completely</u>, the validate button will show error and the state number which is not catered. So before clicking validate, ensure all states are catered.**
- **There can be Multiple Big Warehouses <u>OR</u> Multiple Small Warehouses adjacent to each other, but a combination of Big Warehouse and Small Warehouse cannot exist adjacent to each other.**
- **The cash constraint is $17000, but in case the budget overshoots, the finalists would be shortlisted based on closest to optimum amount and uploading time.**
- **Upload the excel sheet along with the screenshot of the vba simulation with the counters of Big Warehouse and Small Warehouse filled. (For e.g. :)**



ALL THE BEST