BHAKTI VARADKAR **ROLL NO.: 512**

Operation Research – Mini Project

Case Study on North-West Corner Method

INTRODUCTION:

It is a special type of Linear Programming Problem (LPP) in which goods are transported from one set of sources to another set of destinations based on the supply and demand of the origins and destination, respectively, such that the total cost of transportation is minimized.

North-west corner rule is one of the easiest methods to find a feasible solution to a transportation problem. Before getting into detail about the North-west corner rule, let's recall what a transportation problem is.

PROBLEM

A mobile phone manufacturing company has three branches located in three different regions, say Jaipur, Udaipur and Mumbai. The company has to transport mobile phones to three destinations, say Kanpur, Pune and Delhi. The availability from Jaipur, Udaipur and Mumbai is 40, 60 and 70 units respectively. The demand at Kanpur, Pune and Delhi are 70, 40 and 60 respectively. The transportation cost is shown in the matrix below (in Rs). Use the North-West corner method to find a basic feasible solution (BFS).

		Destinations			
		Kanpur	Pune	Delhi	Supply
sources	Jaipur	4	5	1	40
	Udaipur	3	4	3	60
	Mumbai	6	2	8	70
	Demand	70	40	60	170

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SOLUTION:

Step 1: Balance the problem

Balance the problem meaning we need to check that if *Σ Supply = Σ Demand*

If this holds true, then we will consider the given problem as a balanced problem.

Now, what if it's not balanced? i.e., Σ Supply=Σ Demand

If such a condition occurs, then we have to add a dummy source or market; whichever makes the problem balanced. You can watch a video on this type of numerical, which is known as Unbalanced Transportation Problems.

→ The given transportation problem is balanced.

Step 2: Start allocating from North-West corner cell

We will start the allocation from the left hand top most corner (north-west) cell in the matrix and make allocation based on availability and demand.

Now, verify the smallest among the availability (Supply) and requirement (Demand), corresponding to this cell. The smallest value will be allocated to this cell and check out the difference in supply and demand, representing that supply and demand are fulfilled, as shown below.

		Destinations			
		Kanpur	Pune	Delhi	Supply
sources	Jaipur	~~4 (40)~~	~~5~~	~~1~~	~~40~~ ~~0~~
	Udaipur	3	4	3	60
	Mumbai	6	2	8	70
	Demand	~~70~~ 30	40	60	170

Step 3: Remove the row or column whose supply or demand is fulfilled and prepare a new matrix

As we have fulfilled the availability or requirement for that row or column respectively, remove that row or column and prepare a new matrix, as shown below.

		Destinations			
		Kanpur	Pune	Delhi	Supply
sources	Udaipur	3	4	3	60
	Mumbai	6	2	8	70
	Demand	30	40	60	

Step 4: Repeat the procedure until all the allocations are over

Repeat the same procedure of allocation of the new North-west corner so generated and check based on the smallest value as shown below, until all allocations are over.

		Destinations			
		Kanpur	Pune	Delhi	Supply
sources	Udaipur	3 (30)	4	3	~~60~~ 30
	Mumbai	6	2	8	70
	Demand	~~30~~ 0	40	60	

		Destinations		
		Pune	Delhi	Supply
sources	Udaipur	~~4 (30)~~	~~3~~	~~30~~ 0
	Mumbai	2	8	70
	Demand	~~40~~ 10	60	

		Destinations		
		Pune	Delhi	Supply
sources	Mumbai	2 (10)	8(60)	~~70~~ ~~60~~ 0
	Demand	~~10~~ 0	~~60~~ 0	

<u>Step 5: After all the allocations are over, write the allocations and calculate the transportation cost</u>

Once all allocations are over, prepare the table with all allocations marked and calculate the transportation cost as follows.

		Destinations			
		Kanpur	Pune	Delhi	Supply
sources	Jaipur	4 (40)	5	1	40
	Udaipur	3 (30)	4 (30)	3	60
	Mumbai	6	2 (10)	8 (60)	70
	Demand	70	40	60	

→ **Transportation cost**

= (4×40) + (3×30) + (4×30) + (2×10) + (8×60)

= Rs. 870