Course Code : MSCM302

Course Name: Operation Research

TRANSPORTATION PROBLEM

Assumption: destinations do not care from which source the items come, and sources do not care to which destinations they deliver.

Decision variables: x_{ij} = the number of items transported from the *i*-th source to *j*-th destination.

Objective: The goal is to **minimize** the total **cost** of **transportation**.



Name of the Faculty: Dr. Anupama

Course Code : MSCM302

Course Name: Operation Research

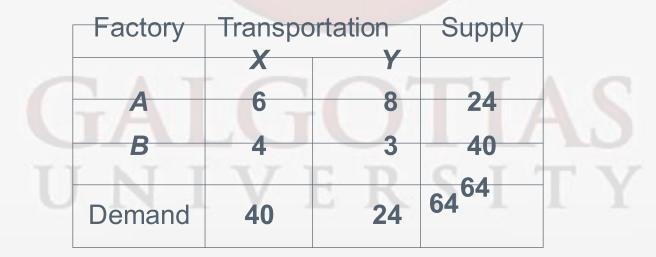
TYPES OF TRANSPORTATION MODEL

Transportation Model

There are two different types of transportation problems based on the initial given information **balanced** and **un-balanced** transportation problems.

Balanced transportation problems

Cases where the total supply is equal to the total amount demanded.



Name of the Faculty: Dr. Anupama

Course Code : MSCM302

Course Name: Operation Research

Un-balanced transportation problems

Cases where the total supply is less than or greater than to the total amount demanded.

•When the supply or availability is higher than the demand, a **dummy** destination is introduced in the equation to make it equal to the supply (with shipping costs of **0\$**); the excess supply is assumed to go to inventory.

GALGOTIAS UNIVERSITY

Course Code : MSCM302

Course Name: Operation Research

METHODS

Methods for obtaining initial feasible basic solution

To find the optimal solution we use two steps.

 First we need to find the initial basic feasible solution by using one of the following three methods

North-west corner, Least cost entry or Vogel's Approximation Method

 Then we obtain an optimal solution by making successive improvements in the initial basic feasible solution until no further decrease in transportation cost is possible. We can use on of the following two methods:

Stepping Stone or Modified Distribution Method

Name of the Faculty: Dr. Anupama

Course Code : MSCM302

Course Name: Operation Research

North-West Corner Method

Step1: Select the upper left (north-west) cell of the

transportation matrix and allocate the maximum possible value to X11 which is equal to min(a1,b1).

<u>Step2</u>:

- If allocation made is equal to the supply available at the first source (a1 in first row), then move vertically down to the cell (2,1).
- If allocation made is equal to demand of the first destination (b1 in first column), then move horizontally to the cell (1,2).
- If a1=b1, then allocate X11= a1 or b1 and move to cell (2,2).

Step3: Continue the process until an allocation is made in the southeast corner cell of the transportation table.

Name of the Faculty: Dr. Anupama

Course Code : MSCM302

Course Name: Operation Research

<u>Example</u>: Solve the Transportation Table to find Initial Basic Feasible Solution using North-West Corner Method.

Total Cost = 19*5+30*2+30*6+40*3+70*4+20*14= Rs. 1015

	Dı	D2	D3	D4	Supply
Sı	19	30	50	10	7
	5	2			1
S2	70	30	40	60	9
32		6	3		9
S3	40	8	70	20	18
	INI	VE	R 4	14	ю
Demand	5	8	7	14	34

Name of the Faculty: Dr. Anupama

Course Code : MSCM302

Course Name: Operation Research

Least Cost Method

<u>Step1</u>: Select the cell having lowest unit cost in the entire table and allocate the minimum of supply or demand values in that cell.

Step2: Then eliminate the row or column in which supply or demand is exhausted. If both the supply and demand values are same, either of the row or column can be eliminated.

In case, the smallest unit cost is not unique, then select the cell where maximum allocation can be made.

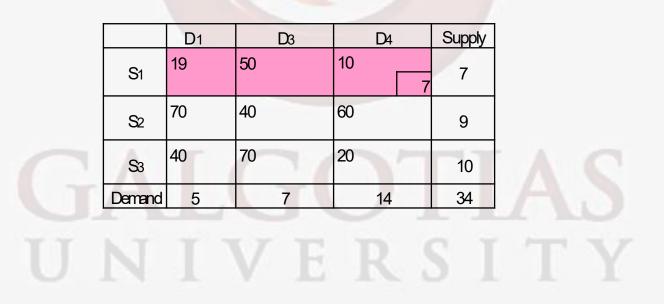
Step3: Repeat the process with next lowest unit cost and continue until the entire available supply at various sources and demand at various destinations is satisfied.

Name of the Faculty: Dr. Anupama

Course Code : MSCM302

Course Name: Operation Research

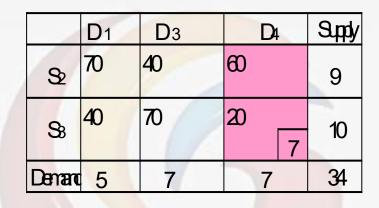


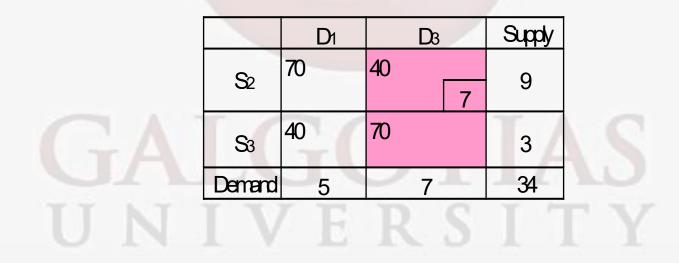


Name of the Faculty: Dr. Anupama

Course Code : MSCM302

Course Name: Operation Research

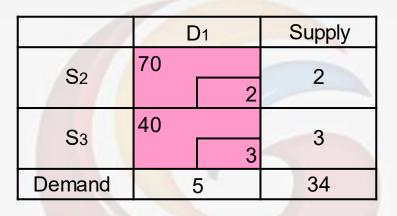




Name of the Faculty: Dr. Anupama

Course Code : MSCM302

Course Name: Operation Research



- The total transportation cost obtained by this method = 8*8+10*7+20*7+40*7+70*2+40*3
- = Rs.814

Here, we can see that the *Least Cost Method* involves a lower cost than the *North-West Corner Method*.

UNIVERSITY

Name of the Faculty: Dr. Anupama

Course Code : MSCM302

Course Name: Operation Research



GALGOTIAS UNIVERSITY

Name of the Faculty: Dr. Anupama