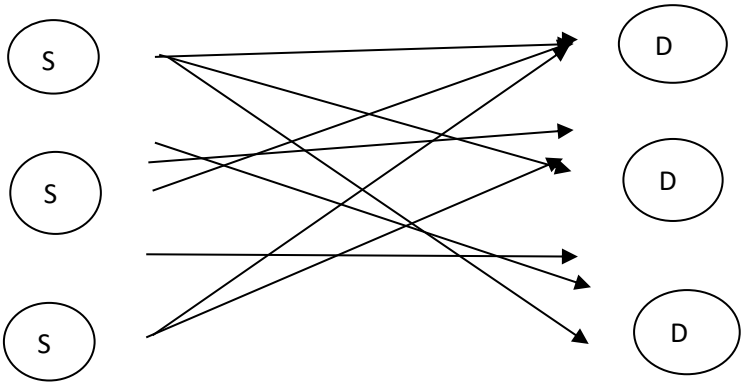
TRANSPORTATION PROBLEM :

The transportation problem is a special type of linear programming problem where the objective consists in minimizing transportation cost of a given commodity from a number of sources of origins (e. g. factory , manufacturing facility) to a number of detinations (e.g. warehouse , store)



Sources (dairy products) destinations

Sources are represented by rows while destinations are represented by coloumns. In general,a transportation prolem has m rows and n coloumns.
The problem is solvable if there are exactly (m+n-1) basic variables.

AIM – to find out optimal solution so as to minimize transportation cost.

Assumptions in transportation problem :

1) Total quantity of item (supply) available at different sources is equal to the total requirement at different destinations.
2) Item can be transported conveniently from all sources to destinations
3) The unit transportation cost of the item from all sources to destinations is certainly and precisely known.
4) The transportation cost on a given route is directly proportional to the number of units shipped on that route.

5) The objective is to minimize the total transportation cost for the organisation as a whole and not for individual supply and distribution centres.

TYPES OF TRANSPORTATION PROBLEM :

Balanced Transportation :

Balanced Transportation Problem is a transportation problem where the total availability at the origins is equal to the total requirements at the destinations.

If the total demand is equal to the total supply.

Unbalanced Transportation :

Unbalanced transportation problem is a transportation problem where the total availability at the origins is not equal to the total requirements at the destinations.

If the total demand is not equal to the total supply

Hungarian method:

Introduction

The Hungarian Method is an algorithm developed by Harold Kuhn to solve assignment problems in polynomial time. The assignment problem is a special case of the transportation problem in which the number of provider and consumer are equal and supply (ai) and demand (bj) amounts are defined as 1.

Typical examples of assignment problems are:

Auction Model: A number of goods has to be evenly distrubuted to an equal number of customer. Every customer has its own price idea on the good he is interested. Goal is to maximize the all-round price.

Job Problem: A number of work assignments has to be distributed to an equally number of workers or machines. The evaluation will be the qualification of a worker or the costs to assign the order to a machine.

With the Hungarian Method such problems can be easily solved without a lot of calculating steps. The solution is binear and integer. In most cases the output table has a quadratic matrix form.

Hungarian method:

The Hungarian method is a combinatorial optimization algorithm that solves the assignment problem in polynomial time and which anticipated later primal–dual methods.

Traveling salesman problem (TSP)

The traveling salesman problem (TSP) is an algorithmic problem tasked with finding the shortest route between a set of points and locations that must be visited.

View:

In the problem statement, the points are the cities a salesperson might visit. The salesman‘s goal is to keep both the travel costs and the distance traveled as low as possible.

Uses:

TSP is often used in computer science to find the most efficient route for data to travel between various nodes. Applications include identifying network or hardware optimization methods.

TSP has been studied for decades and several solutions have been theorized. The simplest solution is to try all possibilities, but this is also the most time consuming and expensive method.

Overall view:

when finding the shortest route, which makes approximate, fast and cheap solutions all the more attractive.

Modified Distribution Method (MODI)

The modified distribution method also known as MODI method or uv method provides minimum cost solution to the transportation problem. In the stepping stone method, we have to draw as many closed paths as equal to the unoccupied cells for their evaluation. To the

contrary in MODI method, only closed path for the unoccupied cell with highest opportunity cost is dawn.

STRUCTURE OF MODI

Destination

		D_1	D_2	D_3	D_4	
Origin	O_1	19	30	50	12	7
	O_2	70	30	40	60	10
	O_3	40	10	60	20	18
	Demand	5	8	7	15	

Availability

Degeneracy in Transportation problem

If the basic feasible solution of a Transportation problem with m origins and n destinations has fewer then (m+n-1) positive X_{ij} (occupied cells) then the problem is said to be a degenerate Transportation problem. To resolve degeneracy, we assign a small arbitrary quantity (Ɛ) to that unoccupied

STRUCTURE OF DEGENERACY

		D_1	D_2	D_3	D_4	Supply
origin	O_1	2	2	2	4	1000
	O_2	4	6	4	3	700
	O_3	3	2	1	0	900
	Demand	900	800	500	400	

Destination

NORTH WEST CORNER METHOD

Definition:

The North-West Corner Rule is a method adopted to compute the initial feasible solution of the transportation problem. The name North-west corner is given to this method because

the basic variables are selected from the extreme left corner.

EAST COST METHOD

Definition:

Least Cost Method is another method used to obtain the initial feasible solution for the transportation problem. Here, the allocation begins with the cell which has the minimum cost. The lower cost cells are chosen over the higher-cost cell with the objective to have the least cost of transportation.

VOGEL'S APPROXIMATION METHOD

A method for finding a first feasible solution to a transportation problem. The procedure begins by finding the two lowest cost cells for each row and column in the transportation problem array. Subtracting the smaller of these costs from the other produces a Vogel number for each row and column.