



A COMPARATIVE STUDY OF THE TRANSPORTATION PROBLEM:THE NORTH- WEST CORNER RULE WITH A HEURISTIC APPROACH TO TRANSPORTATION IN LOGISTICS MANAGEMENT

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ABSTRACT

Logistics Management is the process by which goods can be transported from one area to another area , ie., a storage destination. The main purpose is to compare the Transportation problems:North -West Corner rule with a Heuristic approach to Transportation, so that by using these two models and the North -West Corner Rule ,Heuristics can be used to estimate at what cost the goods are transported to storage locations.The results are taken from the comparison of two models.The Comparative result will have the implications of determining which model is better so that the goods can be reached at the destination at a lower cost.

KEYWORDS: Logistics Management,Comparative Study,Transportation,North West Corner rule,Heuristic Approach.

INTRODUCTION

Logistics Management is the process by which goods can be transported from one area to another area , ie., a storage destination. The transportation methods are applied to see that the goods are transported to storage destination through two models comparison ie., North West corner rule and Heuristic approach.

PURPOSE OF THE STUDY

The main purpose is to compare the Transportation problems:North -West Corner rule with a Heuristic approach to Transportation, so that by using these two models and the North -West Corner Rule ,Heuristics can be used to estimate at what cost the goods are transported to storage locations.

SOURCES OF DATA

The Logistics data source is taken from the website data.world.

Table no 1

Shipment id	Product	Quantity	Origin	Destination	Status
123456	Widgets	1000	Factory A	Warehouse B	In Transit
789012	Gadgets	500	Supplier X	Store Y	Delivered
345678	Gizmos	200	Warehouse C	Customer Z	Pending

METHODOLOGY

The secondary data is taken for tabulation. The comparison is done by using two transportation problem methods, i.e., the north-West Corner Rule and the heuristic approach.

North west corner rule

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.

The North West corner rule is a technique for calculating an initial feasible solution for a transportation problem. In this method, we must select basic variables from the upper left cell, i.e., the North-west corner cell.

North West Corner Rule Steps

Go through the steps given below to understand how to find a feasible solution for a transportation problem.

Step 1: Select the upper-left cell, i.e., the north-west corner cell of the transportation matrix and assign the minimum value of supply or demand, i.e., $\min(\text{supply}, \text{demand})$.

Step 2: Subtract the above minimum value from O_i and D_i of the corresponding row and column. Here, we may get three possibilities, as given below.

If the supply is equal to 0, strike that row and move down to the next cell.

If the demand equals 0, strike that column and move right to the next cell.

If supply and demand are 0, then strike both row and column and move diagonally to the next cell.

Step 3: Repeat these steps until all the supply and demand values are 0.

Heuristic Method-1:

Heuristics is an approach to problem-solving in which the objective is to produce a working solution within a reasonable time frame

Step-1: Calculate the difference between the two lowest cost cells (called Penalty) for each row and column. These are called as row and column penalties, P, respectively.

Step-2: Add the cost of cells for each row and column. These summations are called row and column cost, T, respectively.

Step-3: Compute the product of penalty 'P' and the total cost 'T', that is PT for each row and column.

Step-4: Identify the row/column having lowest 'PT'.

Step-5: Choose the cell having minimum cost in row/column identified in Step-4.

Step-6: Make maximum feasible allocation to the cell chosen in Step-5, if the cost of this cell is also minimum in its column/row. Otherwise allocation is avoided and goto Step-7.

Step-7: Identify the row/column having next to lowest 'PT'.

Step-8: Choose the cell having minimum cost in row/column identified in step 7.

Step-9: Make maximum feasible allocation to the cell chosen in Step-8.

Step-10: Cross out the satisfied row/column.

Step-11: Repeat the procedure until all the requirements are satisfied

RESULTS

The results are taken from the comparison of two models. The Comparative result will have the implications of determining which model is better so that the goods can be reached at the destination at a lower cost.

The table no 1 is converted into transportation table

Origin/Destination	Warehouse B	Store Y	Customer Z	Supply
Factory A	500	500	0	1000
Supplier X	0	0	500	500
Ware house C	0	0	200	200
Demand	500	500	700	1700

North west corner rule result

	D1	D2	D3	Supply
O1	500 (500)	500 (500)	0	1000
O2	0	0	500 (500)	500
O3	0	0	200 (200)	200
Demand	500	500	700	1700

Here O_i is Origin and D_j is Destination where $i=1,2,3$ and $j=1,2,3$

The minimum total transportation cost = $500 \times 500 + 500 \times 500 + 500 \times 500 + 200 \times 200 = \text{Rs.790000}$

Heuristic Method -1 Result

	D1	D2	D3	Supply	Row Penalty (P)	Total (T)	P×T
O1	500	500(300)	0(700)	1000	500 500 500 500	1000	500000 500000 500000 500000
O2	0(500)	0	500	500	0 -- -- --	500	0 -- -- --
O3	0	0(200)	200	200	0 200 -- --	200	0 40000 -- --
Demand	500	500	700	1700			
Column Penalty (P)	0 -- -- --	0 500 500 500	200 200 0 --				
Total (T)	500	500	700				
PXT	0 -- -- --	0 250000 250000 250000	140000 140000 0 --				

The minimum total transportation cost = $500 \times 300 + 0 \times 700 + 0 \times 500 + 0 \times 200 = \text{Rs.150000}$

By comparing these two methods results, the heuristic 1 method gives the minimum transportation cost.

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