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Research Article

SOLVING TRANSPORTATION PROBLEMS USING ICORM METHOD

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ABSTRACT

The most important and successful application in the optimization technique refers to Transportation problem. The objective of Transportation problem is to minimize the cost. In this article a proposed method ICORM (Interchanging Odd Row Method) builds the initial solution which reveals the minimum Transportation problem cost compared to the existing method and also obtains an optimal solution with numerical examples.

KEY WORDS

Transportation, Minimization costs, Sources Supply, Demand, VAM, Optimal solution ICORM.

INTRODUCTION

Transportation problem is a special case of linear programming problem. It plays an important role in logistics & supply chain management for reducing cost & improving service. It helps in solving problems on distribution and transportation of resources from place to another. In this paper we introduce ICORM method for solving transportation which is very helpful for decision maker who are dealing with logistic & supply chain problems. The ICORM solution is illustrate with the help of numerical examples.

TRANSPORTATION PROBLEM:

ALGORITHM OF THE ICORM METHOD:

STEP: 1

Examine whether the total supply equals to the total demand. If not introduce dummy row/column.

STEP: 2

Interchange the odd number of rows (with supply & demand also)

STEP: 3

Find the difference between the smallest cost in each row and write them in bracket also find the difference between the greatest and next greatest cost in each column and write them in bracket.

STEP: 4

Indentify the largest distribution choose the smallest entry along the largest distribution, if there are two or more smallest element choose any one of them arbitrary.

STEP: 5

Allocate $X_{ij} = \min (a_{i,}, b_i)$ on the left top of the smallest entry in the cell (i,j) of the transportation table.

STEP: 6

Recomputed the column and row difference for the reduce transportation table and go to step (5). Repeat the procedure until the rim satisfied.

STEP: 7

After determine the initial solution, the next step is to arrive the optimum solution for transportation problem.

ILLUSTRATION USING VAM METHOD:

	A	B	C	D	Supply
X	11	13	17	14	250
Y	10	18	14	10	300
Z	21	24	13	10	400
Demand	200	225	275	250	

SOLUTION:

Using VAM method

Since $\sum a_i = \sum b_j = 950$

The given transportation problem is balanced, therefore there exist a basic feasible solution to this problem by Vogel's approximation method, the initial solution is as shown in the following table.

200 11	13	17	14	250 (2) (1) - -
10	75 18	14	125 10	300 (4) (4) (4) (4)
21	24	275 13	125 10	400 (3) (3) (3) (3)
200 (5) - - -	225 (5) (5) (6) -	275 (1) (1) (1) (1)	250 (0) (0) (0) (0)	

200 11	0 13	17	14	250
10	175 18	14	125 10	300
21	24	275 13	125 10	400
200	225	275	250	

From this table we that the number of non- negative independent allocation as

$$m + n - 1 = 3 + 4 - 1 = 6$$

Hence the solution is non-degenerate basic feasible

The Initial transportation cost is

$$= (11 \times 200) + (13 \times 50) + (18 \times 175) + (10 \times 125) + (13 \times 275) + (10 \times 125)$$

= Rs .12075/-

ILLUSTRATION USING ICORM METHOD:

Using ICORM method the initial basic feasible solution as follows

STEP: 1

Examine whether the total supply equals to the total demand is 950.

STEP: 2

The odd number of row interchange with includes supply.

STEP: 3

The first column brackets which are the difference between greatest and next greatest element and first row brackets smallest and next to smallest element of the transportation table.

STEP: 4

Identify the largest distribution (10) in a column choose the smallest entry during along the largest distribution is 10. If there are two or more smallest element choose any one of them arbitrary.

STEP: 5

Allocate X_{ij} = min (200, 250) on the left side of the smallest entry in the cell (1, 1) of transportation table.

STEP: 6

Recomputed the column and row difference for th**e** reduced transportation table and go to step (5). Repeat the procedure satisfied until the entire rim.

	A	B	C	D	Supply
X	11	13	17	14	250
Y	10	18	14	10	300
Z	21	24	13	10	400
Demand	200	225	275	250	

SOLUTION

21	24	13	10	400	(3)	(3)	(3)	(3)
10	175 18	14	125 10	300	(4)	(4)	(4)	(4)
200 11	50 13	17	14	250	(2)	(1)	-	-
275	225	200	250					
(10)	(6)	(3)	(4)					
-	(6)	(3)	(4)					

-	(6)	(1)	(0)
-	-	(1)	(0)

From the table we see that the number of non-negative independent allocate as

$$m + n - 1 = 3 + 4 - 1 = 6$$

Hence the solution is non-degenerate basic feasible solution.

The Initial Transportation cost

$$= (275 \times 13) + (125 \times 10) + (175 \times 18) + (125 \times 100) + (200 \times 11) + (50 \times 13)$$

$$= Rs. 12075/-$$

TO FIND THE OPTIMAL SOLUTION FOR ICORM METHOD:

16 21 5	18 24 6	275 13	125 10	$u_1=0$
16 10 6	175 18	13 14 1	125 10	$u_2=0$
200 11	50 13	8 17 9	5 14 9	$u_3=-5$
$v_1=16$	$v_2=18$	$v_3=13$	$v_4=10$	

All $C_{ij} \geq 0$

Optimal solution for transportation problem

$$= (275 \times 13) + (125 \times 10) + (175 \times 18) + (125 \times 10) + (200 \times 11) + (50 \times 13)$$

$$= \text{Rs}. 12075/-$$

CONCLUSION:

The ICORM method is an attractive method which is very simple, easy to understand the proposed method provides an optimal solution which is a main features of this method it avoids large number 0f iteration directly for the given transportation problem.

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