Normalised Optimal Solution for Transportation Problem by Centralised Max-Max Method

S. Vimala , K. Thiagarajan , A. Amaravathy

Abstract: ***In this article, proposed method namely CENTRALISED MAX-MAX method is related for finding the feasible solution for transportation problem. The proffer data is different way to reach optimal solution without confusion of degeneracy condition .***

Keywords: ***Degeneracy, Pay Off Matrix, Transportation problem.***

I. INTRODUCTION

The transportation problem is one of the subclasses of linear programming problem. Here the objective is to transport various quantities of a single homogeneous commodity that are initially stored at various origins to different destinations in such a way that the transportation cost is minimum. There are various methods to find the initial basic feasible solution such as North-West corner rule method , Row minima method, Column minima method, Matrix minima method or least cost method, Vogel's approximation method. The above method needs iteration to get optimal solution but the proposed method helps go get optimal solution with less iteration.

II. CENTRALISED MAX-MAX METHOD APPLY TRANSPORTATION PROBLEM

The new method CENTRALISED MAX-MAX apply transportation problem for finding an feasible solution . The CENTRALISED MAX-MAX method is given below.

First Step

Consider Transportation Table for the given Pay Off Matrix

Second Step

Select the maximum element from Pay off matrix and fix as centre place of Pay of matrix and also consider the same as an origin. Select the particular origin based on the maximum deviation element from the given origin

Third Step

Take maximum element as origin and find the maximum deviated element from the selected origin and also take maximum element as origin and maximum deviated element in the first quadrant (+,+) , second quadrant (-,+),third quadrant (-,-) , fourth quadrant (+,-) from the selected origin

Fourth Step

Apply and fulfill the demand and supply value in the transportation table.

Fifth Step

The total cost is obtained in the origin area for all kind of transportation problem.

III. EXAMPLE

Take the following cost minimizing transportation problems.

ORIGIN

Step I

	D_1	D_2	D_3	D_4	D_5	Supply
S_1	2	11	10	3	7	4
S_2	1	4	7	2	1	8
S_3	3	9	4	8	12	9
Demand	3	3	4	5	6	21

	D_1	D_2	D_3	D_4	D_5	Supply
S_1	2	11	7	10	3	4
S_2	1	4	1	7	2	8
S_3	3	9	12	4	8	9
Demand	3	3	6	4	5	21

Revised Manuscript Received on May 07, 2019.

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	D_1	D_2	D_3	D_4	D_5	Supply
S_1	2	11 [3]	7	10	3	4 [1]
S_2	3	9	12	4	8	9
S_3	1	4	1	7	2	8
Demand	3	3	6	4	5	21

	D_1	D_2	D_3	D_4	D_5	Supply
S_1	2	11	7	10	3	4
S_2	3	9	12	4	8	9
S_3	1	4	1	7	2	8
Demand	3	3	6	4	5	21

Step 2

	D_1	D_3	D_4	D_5	Supply
S_1	2	7	10 [3]	3	1
S_2	3	12	4	8	9
S_3	1	1	7	2	8
Demand	3	6	4 [3]	5	18

	D_1	D_3	D_4	D_5	Supply
S_1	2	7	10	3	1
S_2	3	12	4	8	9
S_3	1	1	7	2	8
Demand	3	6	4	5	18

Step 3

	D_1	D_3	D_4	D_5	Supply
S_2	3	12	4	8	9
S_3	1	1	7 [3]	2	8 [5]
Demand	3	6	3	5	17

	D_1	D_3	D_4	D_5	Supply
S_2	3	12	4	8	9
S_3	1	1	7	2	8
Demand	3	6	3	5	17

Step 4

	D_1	D_3	D_5	Supply
S_2	3	12	8 [5]	9 [4]
S_3	1	1	2	5
Demand	3	6	5	14

	D_1	D_3	D_5	Supply
S_2	3	12	8	9
S_3	1	1	2	5
Demand	3	6	5	14

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	D_1	D_3	Supply
S_2	3 [3]	12	4 [1]
S_3	1	1	5
Demand	3	6	9

	D_1	D_3	Supply
S_2	3	12	4
S_3	1	1	5
Demand	3	6	9

	D_3	Supply
S_2	12 [1]	1
S_3	1 [5]	5
Demand	6	6

	D_1	D_2	D_3	D_4	D_5	Supply
S_1	2	11 [3]	10 [1]	3	7	4
S_2	1	4	7 [3]	2	1 [5]	8
S_3	3 [3]	9	4	8 [5]	12 [1]	9
Demand	3	3	4	5	6	21

$S_1 \to D_2 \Rightarrow$ 11 x 3 = 33 Units
$S_1 \to D_3 \Rightarrow$ 10 x 1 = 10 Units
$S_2 \to D_3 \Rightarrow$ 7 x 3 = 21 Units
$S_2 \to D_5 \Rightarrow$ 1 x 5 = 5 Units
$S_3 \to D_1 \Rightarrow$ 3 x 3 = 9 Units
$S_3 \to D_4 \Rightarrow$ 8 x 5 = 40 Units
$S_3 \to D_5 \Rightarrow$ 12 x 1 = 12 Units

Total cost =. 130 Units

First Quadrant (+,+)

	D_1	D_2	D_3	D_4	D_5	Supply
S_1	2	11	10 [4]	3	7	4
S_2	1 [2]	4	7	2	1 [6]	8
S_3	3 [1]	9 [3]	4	8 [5]	12	9
Demand	3	3	4	5	6	21

$S_1 \to D_3 \Rightarrow$ 10 x 4 = 40 Units
$S_2 \to D_1 \Rightarrow$ 1 x 2 = 2 Units
$S_2 \to D_5 \Rightarrow$ 1 x 6 = 6 Units
$S_3 \to D_1 \Rightarrow$ 3 x 1 = 3 Units
$S_3 \to D_2 \Rightarrow$ 9 x 3 = 27 Units
$S_3 \to D_4 \Rightarrow$ 8 x 5 = 40 Units

Total cost =. 118 Units

Second Quadrant (-,+)

	D_1	D_2	D_3	D_4	D_5	Supply
S_1	2	11 [3]	10	3	7 [1]	4
S_2	1	4	7	2 [5]	1 [3]	8
S_3	3 [3]	9	4 [4]	8	12 [2]	9
Demand	3	3	4	5	6	21

$S_1 \to D_2 \Rightarrow$ 11 x 3 = 33 Units
$S_1 \to D_5 \Rightarrow$ 7 x 1 = 7 Units
$S_2 \to D_4 \Rightarrow$ 2 x 5 = 10 Units
$S_2 \to D_5 \Rightarrow$ 1 x 3 = 3 Units
$S_3 \to D_1 \Rightarrow$ 3 x 3 = 9 Units
$S_3 \to D_3 \Rightarrow$ 4 x 4 = 16 Units
$S_3 \to D_5 \Rightarrow$ 12 x 2 = 24 Units

Total cost =. 102 Units

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Third Quadrant (-,-)

	D_1	D_2	D_3	D_4	D_5	Supply
S_1	2	11	10	3 [2]	7 [2]	4
S_2	1	4	7 [4]	2	1 [4]	8
S_3	3 [3]	9 [3]	4	8 [3]	12	9
Demand	3	3	4	5	6	21

$S_1 \rightarrow D_4 \Rightarrow 3 \text{ x } 2 = 6$ Units
$S_1 \rightarrow D_5 \Rightarrow 7 \text{ x } 2 = 14$ Units
$S_2 \rightarrow D_3 \Rightarrow 7 \text{ x } 4 = 28$ Units
$S_2 \rightarrow D_5 \Rightarrow 1 \text{ x } 4 = 4$ Units
$S_3 \rightarrow D_1 \Rightarrow 3 \text{ x } 3 = 9$ Units
$S_3 \rightarrow D_2 \Rightarrow 9 \text{ x } 3 = 27$ Units
$S_3 \rightarrow D_4 \Rightarrow 8 \text{ x } 3 = 24$ Units

Total cost =. 112 Units

Fourth Quadrant (+,-)
The basic feasible solution is

	D_1	D_2	D_3	D_4	D_5	Supply
S_1	2 [2]	11	10	3	7 [2]	4
S_2	1	4	7 [4]	2	1 [4]	8
S_3	3 [1]	9 [3]	4	8 [5]	12	9
Demand	3	3	4	5	6	21

$S_1 \rightarrow D_1 \Rightarrow 2 \text{ x } 2 = 4$ Units
$S_1 \rightarrow D_5 \Rightarrow 7 \text{ x } 2 = 14$ Units
$S_2 \rightarrow D_3 \Rightarrow 7 \text{ x } 4 = 28$ Units
$S_2 \rightarrow D_5 \Rightarrow 1 \text{ x } 4 = 4$ Units
$S_3 \rightarrow D_1 \Rightarrow 3 \text{ x } 1 = 3$ Units
$S_3 \rightarrow D_2 \Rightarrow 9 \text{ x } 3 = 27$ Units
$S_3 \rightarrow D_4 \Rightarrow 8 \text{ x } 5 = 40$ Units

Total cost =. 120 Units

IV. CONCLUSION

The CENTRALISED MAX-MAX method gives an optimal feasible value of the objective function for the transportation problem. The proposed method gives systematic procedure to get an optimal solution and very easy to understand. It can be extended to assignment problems and travelling salesman problems to obtain optimal solution. The proposed method is important tool for the decision makers when they are handling various types of logistic problems.

ACKNOWLEDGEMENT

The authors would like to thank Dr. Ponnammal Natarajan, Former Director of Research and Development, Anna University, Chennai, India for her best ideas and support to complete this article.

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