Scientific Journal of Impact Factor (SJIF): 5.71
e-ISSN (O): 2348-4470
p-ISSN (P): 2348-6406
International Journal of Advance Engineering and Research Development
Volume 5, Issue 02, February -2018

Solution of Transportation Problem with ASM Method and Comparison with Existing Methods for Optimum Solution

Rajendra B. Patel

Assistant Professor, R.R.Mehta Science and Commerce College, Palanpur, Gujarat

ABSTRACT:- *Finding optimum solution for the transportation method is important and we need to apply very lengthy and tedious method like VAM and MODI to attain the optimum solution. In present paper the suggestion is made to use the ASM method which is giving the optimum solution and the process is very easy to apply.*

INTRODUCTION

In this paper i have made discussion about the solving the Transportation Problem (TP). In the existing literature we observe that the VAM, i.e. the Vogal's Approximation Method gives the best result and near to optimal results. Further the MODI, i.e. Modified Distribution method gives the exact optimum solution of the transportation problem. In this paper a new method namely ASM Method is discussed, it is given by Abdul Quddoos, Shakeel Javaid and M.M.Khalid in 2012. The method is discussed and checked with the optimal solution, it is observed that the ASM method gives the exact optimum solution which is same as the solution updated with MODI method over VAM.

TRANSPORTATION PROBLEM & ITS OPTIMUM SOLUTION WITH VAM

The following transportation problem is considered for solution with Vogal's Approximation Method

	Supply 1	Supply 2	Supply 3	Supply 4	Total
Demand 1	19	30	50	10	7
Demand 2	70	30	40	60	9
Demand 3	40	8	70	20	18
Total	5	8	7	14	34

If the above TP is solved by VAM the solution will be the following

	Supply 1	Supply 2	Supply 3	Supply 4	Total
Demand 1	19 $\boxed{5}$	30	50	10 $\boxed{2}$	7
Demand 2	70	30	40 $\boxed{7}$	60 $\boxed{2}$	9
Demand 3	40	8 $\boxed{8}$	70	20 $\boxed{10}$	18
Total	5	8	7	14	34

The total cost of transportation is 1015. If the MODI (Modified Distribution) method is applied for finding out the optimum solution of the problem the solution will be improved as following.

	Supply 1	Supply 2	Supply 3	Supply 4	Total
Demand 1	19 $\boxed{5}$	30	50	10 $\boxed{2}$	7
Demand 2	70	30 $\boxed{2}$	40 $\boxed{7}$	60	9
Demand 3	40	8 $\boxed{6}$	70	20 $\boxed{12}$	18
Total	5	8	7	14	34

With this MODI method the total cost of transportation is 743, which is optimum solution.

ASM Method FOR SOLVING TRANSPORTATION PROBLEM

The ASM method given by Abdul Quddoos, Shakeel Javaid and M.M.Khalid[1] is applied to the transportation problem. The step by step procedure to obtain solution is given below.

@IJAERD-2018, All rights Reserved

Step 1: Construct the transportation table from given transportation problem.

	Supply 1	Supply 2	Supply 3	Supply 4	Total
Demand 1	19	30	50	10	7
Demand 2	70	30	40	60	9
Demand 3	40	8	70	20	18
Total	5	8	7	14	34

Step 2: Subtract each row entries of the transportation table from the respective row minimum. The following reduced table is obtained

	Supply 1	Supply 2	Supply 3	Supply 4	Total
Demand 1	9	20	40	0	7
Demand 2	40	0	10	30	9
Demand 3	32	0	62	12	18
Total	5	8	7	14	34

Step 3: Subtract each column entries of the resulting transportation table from respective column minimum.

	Supply 1	Supply 2	Supply 3	Supply 4	Total
Demand 1	0	20	30	0	7
Demand 2	31	0	0	30	9
Demand 3	23	0	52	12	18
Total	5	8	7	14	34

Step 4: Now there will be at least one zero in each row and in each column in the reduced cost matrix. Select the first zero (row-wise) occurring in the cost matrix. Suppose (i, j)th zero is selected, count the total number of zeros (excluding the selected one) in the ith row and jth column. Now select the next zero and count the total number of zeros in the corresponding row and column in the same manner. Continue it for all zeros in the cost matrix.

Here in our problem the zeros are in the cell (1,1), (1,4), (2,2), (2,3) and (3,2). As per method the zeros, corresponding to the each cell containing zero are : (1,1) – 1, (1,4) – 1, (2,2) – 2, (2,3) – 1, and (3,2) – 1.

Step 5: Now choose a zero for which the number of zeros counted in step 4 is minimum and supply maximum possible amount to that cell. If tie occurs for some zeros in step 3 then choose a (k,l)th zero breaking tie such that the total sum of all the elements in the kth row and lth column is maximum. Allocate maximum possible amount to that cell.

In our problem there is tie between cell (1,1), (1,4), (2,3) and (3,2) , using the tie breaking algorithm, we obtain the total of the row and column entries as : (1,1) – 238, (1,4) – 199, (2,3) – 360 and (3,2) – 206. Therefore the first allocation is done in the cell (2,3) with maximum total as 360. The maximum possible allocation is 7 units.

Step 6: After performing step 5, delete the row or column for further calculation where the supply from a given source is depleted or the demand for a given destination is satisfied.

Step 7: Check whether the resultant matrix possesses at least one zero in each row and in each column. If not, repeat step 2, otherwise goto step 8.

Step 8: Repeat step 4 to step 7 until and unless all the demands are satisfied and all the supplies are exhausted. The final solution with this process is as following.

	Supply 1	Supply 2	Supply 3	Supply 4	Total
Demand 1	19 $\boxed{5}$	30	50	10 $\boxed{2}$	7
Demand 2	70	30 $\boxed{2}$	40 $\boxed{7}$	60	9
Demand 3	40	8 $\boxed{6}$	70	20 $\boxed{12}$	18
Total	5	8	7	14	34

The total cost of transportation is 743, which is as same as that obtain with MODI Method.

@IJAERD-2018, All rights Reserved

Thus the ASM method is giving the optimum solution, and saves the time over VAM and MODI method. The algorithm of this method is easy and solution is best, so the ASM method is considered as the best method for the solution of Transportation Problem.

REFERENCES

[1] Abdul Quddoos, Shakeel Javaid and M. M. Khalid, A New Method for Finding an Optimal Solution for Transportation Problems, *International Journal on Computer Science and Engineering*, Vol.4, No.7, pp1271-1274, 2012.

[1] A. Charnes, W.W. Cooper and A. Henderson, An Introduction to Linear Programming, Wiley, New York, 1953.

[2] F.L. Hitchcock, The distribution of a product from several sources to numerous localities, *Journal of Mathematical Physics*, vol 20, pp.224-230, 2006

[3] G.B. Dantzig, Linear Programming and Extensions, Princeton University Press, Princeton, N J, 1963.

[4] Taha. H.A., Operations Research- Introduction, Prentice Hall of India (PVT), New Delhi, 2004.

[5] Sharma. J.K., Operations Research-Theory and applications, Macmillan India (LTD), New Delhi, 2005.

[6] V. J. Sudhakar, N. Arunsankar and T. Karpagam, A New approach for finding an Optimal Solution for Transportation Problems, *European Journal of Scientific Research*, vol 68, pp. 254-257, 2012

[7] A. Edward Samuel and M. Venkatachalapathy, Modified Vogel's Approximation Method for Fuzzy Transportation Problems, *Applied Mathenatical Sciences*, vol 28, pp. 1367-1372, 2011.

[8] Chandrasekhar Putcha, Aditya K. Putcha, MD Rohul Amin Bhuiyan and Nasima Farzana Hoque, Development of New Optimal Method for Solution of Transportation Problems, Preceeding of World Congress on Engineering 2010.

[9] H. Arsham, Post optimality analyses of the transportation problem, *Journal of the Operational Research Society*, vol 43, pp. 121–139, 1992.

[10] A.Henderson and R. Schlaifer Mathematical programming:Better information for better decision-making, *Harvard Business Review*, vol 32, pp. 73-100, 1954.

[11] Koopmans T. C., Optimum Utiliztion of Transportation System, *Econometrica*, Supplement vol 17, 1949.

[12] P.Pandian and G. Natarajan, A New Method for Finding an Optimal Solution for Transportation Problems, *International J. of Math. Sci. & Engg. Appls*., vol 4, pp. 59-65, 2010.

@IJAERD-2018, All rights Reserved