A New Approach To Find The Optimum Solution of A Transportation Problem Using PR -Method

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Abstract- *In this paper, the optimum solution for the transportation is found through Range and compare the result with VAM, LCM, NWC and MODI. The most impressive feature of this method is that it requires very simple statistical calculation, which compared to the MODI Method. The objective is to satisfy the minimum transportation cost for the given constraints. The developed algorithms with some numerical illustrations are discussed in this article.*

Keywords- Transportation problems (TP), Initial Basic Feasible Solution (IBFS), Optimal Solution (OS),Range.

I. INTRODUCTION

Transportation plays a vital role in our economy as well as in legislative decision making. The fundamental transportation problem was mainly urbanized by F.L.Hitchcock (1941) [1] in his study on the topic "the distribution of a product from several sources to numerous location". In 1947, T.C. Koopmans independently established a study on "optimum utilization of the transportation system". The LP formulation and the associated systematic procedure for solution were given by George B.Dantzig (1951) [2]. Many implements of its model and methods have subsequently been extended.

In the past few year Sudhaker et.al [3] and Abdual Quddoos et.al [4] implemented two different methods in 2012 respectively, for finding an optimal solution. In 1954 charnes and copper [5] was developed Stepping Stone method on "The Simplex method is not suitable for the Transportation problem especially for large scale transportation problem due to its special structure of model".

Now a days the researchers recently focus on many different methods that provide a betterment for transportation problem .Urvashikumari D.Patel et.al. [6] established "Transportation Problem using Stepping Stone Method and its Application. And also Neetu M.Sharma et.al [7] cope with "An alternative method to north west corner method for solving transportation problem which is totally new concept. A.Amaravathy et.al [8], Reena G.Patel et.al [9, 10] and Sushma Duraphe et.al [11] implemented the method is very helpful by solving less iterations and also required minimum time period for getting optimal solution.

In this article we proposed a new concept for solving TP in easiest manner. The geometric mean of a series of n positive observations is defined as the n^{th} root of their Product.

Range= Maximum Cost – Minimum Cost

II. ALGORITHM FOR PRM

Step1: Determine whether the transportation problem is balanced or not. If it is balanced then proceed further step.
Step2: Obtain the Range for each row and column by using the corresponding principle.
Step3: Choose the highest value from step2 and allot the min (supply or demand) at the place of minimum value of corresponding row or column.
Step4: Reiterate step2 and step3 till the demands or supplies become zero.
Step5: Total minimum cost is estimated as sum of the product of cost and its subsequent allocated values of supply/Demand.

III.NUMERICAL ILLUSTRATION

(3.1)Illustrate

	D_1	D_2	D_3	D_4	Supply
S_1	7	5	9	11	30
S_2	4	3	8	6	25
S_3	3	8	10	5	20
S_4	2	6	7	3	15
Demand	30	30	20	10	**90**

Solution:

The above mentioned transportation table is balanced, therefore it exist a **IBFS** to **PRM** method.

	D_1	D_2	D_3	D_4	Supply				
S_1	3	1 300	7	4	300	(6)	(6)	**	**
S_2	2 250	6	5 150	9	400, 150	(7)	(4)	(4)	(1)
S_3	8	3 50	3 250	2 200	500,300, 250	(6)	(1)	(1)	(0)
Demand	250	350, 50	250, 250	200	**1200**				
	(6)	(5)	(4)	(7)					
	**	(5)	(4)	(7)					
	**	(5)	(4)	(7)					
	**	(3)	(2)	**					

The Transportation cost is

$$Z = 1*300 + 2*250 + 5*150 + 3*150 + 3*250 + 2*200 = \mathbf{2850}/-$$

(3.2) Illustrate

	D_1	D_2	D_3	D_4	Supply
S_1	7	5	9	11	30
S_2	4	3	8	6	25
S_3	3	8	10	5	20
S_4	2	6	7	3	15
Demand	30	30	20	10	**90**

Solution:

The above mentioned transportation table is balanced, therefore it exist a **IBFS** to **PRM** method.

	D_1	D_2	D_3	D_4	Supply				
S_1	7 5	5 5	9 20	11	30, 10, 5	(8)	(4)	(4)	(4)
S_2	4	3 25	8	6	25	(5)	(5)	(5)	(5)
S_3	3 20	8	10	5	20	(7)	(7)	**	**
S_4	2 5	6	7	3 10	15, 5	(5)	(5)	(5)	**
Demand	30, 10, 5	30, 5	20	10	**90**				
	(5)	(5)	(3)	(8)					
	(5)	(5)	(3)	**					
	(5)	(3)	(2)	**					
	(5)	(3)	(2)	**					

The Transportation cost is

$$Z = 7*5 + 5*5 + 9*20 + 3*25 + 3*20 + 2*5 + 3*10 = \mathbf{415}/-$$

IV. COMPARISON OF NUMERICAL RESULTS

Comparision of the numerical results which are obtain from the above problem is shown below

Method	Example 3.1	Example 3.2
Proposed Range Method	2850	415
North West Corner Method	4400	540
Least Cost Method	2850	435
VAM	2850	470
MODI-Method	2850	415

V. RESULTS AND DISCUSSION

In this article, we implemented the algorithm for less iterations and getting minimum optimal solution. And also we have described the comparison results for various methods of TPM and PRM is same as MODI's method in Table 4. Finally, we conclude that the PRM is important Geometrical tool for the decision makers when they are handling the variety of logistic problems.

VI. CONCLUSION

In this article, we implemented the algorithm for less iterations and getting minimum optimal solution. And also we have described the comparison results for Range Method which is same as MODI method. The Range method is important Arithemtic tool for the decision makers when they are handling the variety of logistic problems.

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