International Journal of Emerging Technology and Advanced Engineering
Website: www.ijetae.com (ISSN 2250-2459, ISO 9001:2008 Certified Journal, Volume 7, Issue 8, August 2017)

Study of Application of Linear Programming (Assignment Problem) using QBS & HUNGARIAN Method

Dr. Reena Garg

Assistant Professor (Mathematics), Humanities and Sciences Department, YMCA University of Science and Technology-121006, Faridabad (Haryana)-India

***Abstract*— This paper aims to clear the theoretical aspects of the assignment problem and provide the cost of resource to a no.of destinations to as minimum as possible This will achieve better productivity goals of reducing cost and maximizing profit . we will also compare the result obtained by Hungarian method and quantity business software.**

***Keywords*— Assignment problem, cost, profit, QBS, Hungarian method.**

I. INTRODUCTION

The assignment problem is nothing else than a balanced transportation problem in which all supplies and demands are equal to 1. One of the most widely used methods for solving assignment problems is called, the Hungarian method. This method of assignment was developed by the Hungarian mathematician D. Konig in 1955, and is therefore known as Hungarian method of assignment problem.

II. TYPES OF ASSIGNMENT PROBLEM

- Minimization type of assignment problems.
- Maximization type of assignment problems.
- Assignment problems having non-square cost matrix.
- convert a non-square matrix into a square matrix.
- Assignment problems with restrictions.

III. THE THEORITICAL FRAMEWORK

The mathematical assignment model using a linear programming is described as follows:

1-A set of m jobs.
2-A set of n workers.
3-A cost variable Cij of assigning a worker i assigned to do a job j.

Table 1

Worker	Job of Work					
	1	2	3	4	jth	n
1.	Co_{11}	Co_{12}	Co_{13}	Co_{14}	.....	Co_{m}
2.	Co_{21}	Co_{22}	Co_{23}	Co_{24}	.....	Co_{2n}
3.	Co_{31}	Co_{32}	Co_{33}	Co_{34}	.....	Co_{3n}
i^{th}				Co_{ij}		
n^{th}	Co_{n1}	Co_{n2}	Co_{n3}	Co_{n4}	.....	Co_{nm}

Let x_{ij} be the no. Of units produced by a worker 1 when assign tothe job j.

Subject to:

$$\sum X_{ij} = 1 \text{ ,} i = 1,2,\ldots\ldots..n$$

$$\sum X_{ij} = 1, j = 1,2,\ldots\ldots..m$$

The steps of solving Hungarian method are as follows:

step 1: Given the cost matrix, construct a new matrix by subtracting from each cost the minimum cost in its row. For this new matrix find the minimum cost in each column and subtract from each cost the minimum cost in its column.

Step 2: Draw the least number of horizontal and vertical lines so as to cover all zeros, Let us denote the total number of these lines by N.

International Journal of Emerging Technology and Advanced Engineering
Website: www.ijetae.com (ISSN 2250-2459, ISO 9001:2008 Certified Journal, Volume 7, Issue 8, August 2017)

i) If the number of these lines is n, then an optimal solution is available among the covered zeros, we therefore proceed to step V.
ii) If the number of lines is less than n then we proceed to

Step 3 : Determine the smallest non zero cost cell from among the uncrossed cells. Subtract this cost from all the uncrossed elements of the reduced cost matrix, and add the same smallest cost to each element that is covered by two lines. Return to step II

Step 4: we are now having exactly one zero in each row and each column of the cost matrix. The assignment schedule should be corresponding to the zeros in the optimum (maximal) assignment..

IV. The Problem

A job has four men available for work on four separate jobs. The cost of assigning each man to a job is given in the following table .The objective is to assign men to jobs such that the cost of assignment is minimum.

Person	1	2	3	4
A	20	25	22	28
B	15	18	23	17
C	19	17	21	24
D	25	23	24	24

Solution by Hungarian method

Person	1	2	3	4
A	0	4	0	6
B	0	2	6	0
C	3	0	3	6
D	3	0	0	0

Total cost of assignment = A1+B4+C2+D3

= 20+17+24+17

=78

Solution by win QRS

NoCCC	From	To	Assignment	Unit Profit	Total Profit
1	A	1	1	20	20
2	B	4	1	17	17
3	C	2	1	24	24
4	D	3	1	17	17

Total objective function value=78

International Journal of Emerging Technology and Advanced Engineering
Website: www.ijetae.com (ISSN 2250-2459, ISO 9001:2008 Certified Journal, Volume 7, Issue 8, August 2017)

V. CONCLUSION

The total profit associated with the optimal person to job assignment pattern. The manual solution is similar to the results obtained from the win QSB solution

REFERENCES

[1] Frederick S, Hillier, Gerald J. Limber man, Introduction to Operation Research, Seventh Edition McGraw-Hill Higher Education, 2001 pp 382)

[2] Gillet, B.E., "Introduction to Operation Research : a computer oriented algorithmic approach".

[3] Hamdy,A Taha , Operation Research An introduction.Eighth edition, Pearson prentice Hall, 2007 pp 221

[4] Hillier F., and Lieberman, G.J. "Introduction to Operation Research",Holden Day

[5] Kambo, N.S., "Mathematical Programming Techniques",McGraw Hill.

[6] KantiSwaroop, Gupta P.K. Man Mohan, "Operations Research",Sultan Chand and Sons