Quantitative Management Modeling

Fall 2020

Heart Transportation Problem

Solution

- A transportation problem will have feasible solutions if and only if total supply = total demand
- Monthly supply is 220, while the monthly demand is 210,
  So, we will create a (dummy warehouse 4) that demand 10 units
- The Total cost for each unit is (production cost + shipping cost)
- The Coefficients of the Dummy Variables are 0

Table 1 Heart Co. problem

	Unit total cost (production plus shipping)				Monthly production capacity (**supply**)
	1	2	3	4 (Dummy)	
A	622	614	630	0	100
B	641	645	649	0	120
Monthly **Demand**	80	60	70	10	**220**

Decision Variables:

Z: objective variable to minimize the combined cost

Ij : (i: A,B),(j:1,2,3,4)

A1: represents the number of units produced and shipped from plant A to warehouse 1 each month.

A2: represents the number of units produced and shipped from plant A to warehouse 2 each month.

A3: represents the number of units produced and shipped from plant A to warehouse 3 each month.

A4: represents the number of units produced and shipped from plant A to a dummy warehouse 4.

B1: represents the number of units produced and shipped from plant B to warehouse 1 each month.

B2: represents the number of units produced and shipped from plant B to warehouse 2 each month.

B3: represents the number of units produced and shipped from plant B to warehouse 3 each month.

B4: represents the number of units produced and shipped from plant B to a dummy warehouse 4.

Objective Function:

$$\textbf{Min.} \quad Z = 622\,A1 + 614\,A2 + 630\,A3 + 641\,B1 + 645\,B2 + 649\,B3$$

S.T.

$$A1 + A2 + A3 + A4 = 100$$

$$B1 + B2 + B3 + B4 = 120$$

$$A1 + B1 = 80$$

$$A2 + B2 = 60$$

$$A3 + B3 = 70$$

$$A4 + B4 = 10$$

$$A1, A2, A3, B1, B2, B3, A4, B4 \geq 0$$

 # let's solve the problem using *lpsolve* in *R*