

24/11/21

Module 3 (Haitamias)

Transportation Problem

North-West Corner Method

- Find the initial basic feasible soln. to the transportation problem given below by the North West Corner Method.

| | D ₁ | D ₂ | D ₃ | Supply |
|----------------|----------------|----------------|----------------|--------|
| O ₁ | 2 | 7 | 4 | 5 |
| O ₂ | 3 | 3 | 1 | 8 |
| O ₃ | 5 | 4 | 7 | 7 |
| O ₄ | 1 | 6 | 2 | 14 |
| Demand | 7 | 9 | 18 | |

| | | | | |
|---|---|----|----|---|
| 5 | 2 | 7 | 4 | 5 |
| 3 | 3 | 1 | 8 | |
| 5 | 4 | 7 | 7 | |
| 1 | 6 | 2 | 14 | |
| 2 | 9 | 18 | | |

| | | | | |
|---|---|----|---|----|
| 2 | 3 | 3 | 1 | 86 |
| | 5 | 4 | 7 | 7 |
| | 1 | 6 | 2 | 14 |
| 2 | 9 | 18 | | |

| | | |
|---|---|---|
| 6 | | |
| - | - | 3 |
| | | 4 |
| | | 7 |
| | 6 | 2 |

18

3

| | | | |
|---|---|---|----|
| 3 | | | 4 |
| | 4 | 7 | |
| | 6 | 2 | 14 |
| | | | 18 |

| 4 | 7 | 4 |
|---|---|----|
| 4 | 2 | 14 |
| 3 | 9 | 18 |

| | | | |
|---|---|---|---|
| 5 | | | |
| | 2 | 7 | 4 |
| 2 | 6 | | |
| | 3 | 3 | 1 |
| | 3 | 4 | |
| 5 | | 4 | 7 |
| | | 4 | |
| 1 | | 6 | 2 |

$$\text{Total cost} = 5 \times 2 + 2 \times 3 + 6 \times 3 + 8 \times 4 + 4 \times 7 + 14 \times 2$$

$$\begin{aligned}
 &= 10 + 6 + 18 + \\
 &\quad 12 + 28 + 28 \\
 &= 102
 \end{aligned}$$

? Det. an initial basic feasible soln to the following Transp. Pblm using north-west corner method.

| | D_1 | D_2 | D_3 | D_4 | |
|-------|-------|-------|-------|-------|----|
| O_1 | 6 | 4 | 1 | 5 | 14 |
| O_2 | 8 | 9 | 2 | 7 | 16 |
| O_3 | 4 | 3 | 6 | 2 | 5 |
| | 6 | 10 | 15 | 4 | |

| | | | | |
|----|----|----|---|----|
| 6 | | | | 8 |
| 6 | 4 | 1 | 5 | 14 |
| 8 | 9 | 2 | 7 | 16 |
| | | | | 5 |
| 4 | 3 | 6 | 2 | |
| 14 | 10 | 15 | 4 | |

| | | | | |
|----|----|----|---|----|
| 8 | | | | |
| | 4 | 1 | 5 | 8 |
| 2 | | 14 | | |
| | 9 | 2 | 7 | 16 |
| | | 11 | 4 | |
| | 3 | 6 | 2 | 5 |
| 14 | 15 | 4 | | |
| 2 | | | | |

| | | | | |
|---|---|----|---|---|
| 6 | 8 | | | |
| | 6 | 4 | 1 | 5 |
| | 2 | 14 | | |
| | 8 | 9 | 2 | 7 |
| | | 11 | 4 | |
| | 4 | 3 | 6 | 2 |

$$\begin{aligned}
 \text{Total cost} &= 6 \times 6 + 8 \times 4 + 2 \times 9 \\
 &\quad + 14 \times 2 + 1 \times 6 + 4 \times 2 \\
 &= 36 + 32 + 18 + 28 + 6 + 8 \\
 &= 128
 \end{aligned}$$

08/12/2007

Least cost method

Also called matrix min. method. This method takes into account the min unit cost chose the cell having the lowest cost in the matrix allocate to that cell as much as possible.

Thus either a row total or a column total is exhausted. Cross of the corr. rows or columns from the reduced matrix locate the cell having the lowest cost.

Allocate to that cell max. the max. possible quantities. Continue the process until all the available quantities are exhausted.

Q. Find the initial basic feasible soln to the following trans. problem by least cost method.

| | w_1 | w_2 | w_3 | |
|-------|-------|-------|-------|----|
| F_1 | 2 | 7 | 4 | 5 |
| F_2 | 3 | 3 | 1 | 8 |
| F_3 | 5 | 4 | 7 | 7 |
| F_4 | 1 | 6 | 2 | 14 |
| | 7 | 9 | 18 | |

| | w_1 | w_2 | w_3 | |
|-------|-------|-------|-------|----|
| F_1 | 2 | 7 | 4 | 5 |
| F_2 | 3 | 3 | 1 | 8 |
| F_3 | 5 | 4 | 7 | 7 |
| F_4 | 1 | 6 | 2 | 14 |
| | 7 | 9 | 18 | |

| | w_2 | w_3 | |
|-------|-------|-------|---|
| F_1 | 7 | 4 | 5 |
| F_3 | 4 | 7 | 7 |
| | 9 | 3 | |

| | w_1 | w_2 | w_3 | |
|-------|-------|-------|-------|----|
| F_1 | 2 | 7 | 4 | 5 |
| F_2 | 3 | 3 | 1 | 8 |
| F_3 | 5 | 4 | 7 | 7 |
| F_4 | 1 | 6 | 2 | 14 |
| | 7 | 9 | 18 | |

$$\begin{aligned}
 \text{Total cost} &= (2 \times 4) + (3 \times 4) + (8 \times 1) + (1 \times 4) + (7 \times 1) + (7 \times 2) \\
 &= 14 + 12 + 8 + 4 + 7 + 14 \\
 &= 83
 \end{aligned}$$

Q. Determine the initial basic feasible solution of the transportation problem by least cost method.

| | A | B | C | D | |
|---|----|----|----|----|----|
| 1 | 1 | 5 | 3 | 3 | 34 |
| 2 | 3 | 3 | 1 | 2 | 15 |
| 3 | 0 | 2 | 2 | 3 | 12 |
| 4 | 2 | 7 | 2 | 4 | 19 |
| | 21 | 25 | 17 | 17 | |

Vogel's Approximation Method

Step 1:

Q. Find the initial soln of the transportation problem by Vogel's method.

| | A | B | C | D | |
|---|----|----|----|----|----|
| 1 | 1 | 5 | 3 | 3 | 34 |
| 2 | 3 | 3 | 1 | 2 | 15 |
| 3 | 0 | 2 | 2 | 3 | 12 |
| 4 | 2 | 7 | 2 | 4 | 19 |
| | 21 | 25 | 17 | 17 | |

| | w_1 | w_2 | w_3 | |
|-------|-------|-------|-------|--------|
| F_1 | 2 | 7 | 4 | 5 (2) |
| F_2 | 3 | 3 | 1 | 8 (2) |
| F_3 | 5 | 4 | 7 | 7 (1) |
| F_4 | 1 | 6 | 2 | 14 (1) |
| | 7 | 9 | 18 | |
| | (1) 2 | (1) | (1) | |

| | A | B | C | D | |
|---|----|----|----|----|----|
| 1 | 1 | 5 | 3 | 3 | 34 |
| 2 | 3 | 3 | 1 | 2 | 15 |
| 3 | 0 | 2 | 2 | 3 | 12 |
| 4 | 2 | 7 | 2 | 4 | 19 |
| | 21 | 25 | 17 | 17 | |

| | w_1 | w_2 | w_3 | |
|-------|-------|-------|-------|--------|
| F_2 | 3 | 3 | 1 | 8 (2) |
| F_3 | 5 | 4 | 7 | 7 (1) |
| F_4 | 1 | 6 | 2 | 14 (1) |
| | 2 | 9 | 18 | |
| | (2) | (1) | (1) | 10 |

| | w_1 | w_2 | w_3 | |
|-------|-------|-------|-------|-----|
| F_3 | 5 | 4 | 7 | (1) |
| F_4 | 1 | 6 | 2 | (1) |
| | 2 | 9 | 10 | |
| | (4) | (2) | (5) | |

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Q. Find the initial cost soln for transp. for Vogel's method

| | w_1 | w_2 | |
|-------|-------|-------|-------|
| F_3 | | 5 | 4 (1) |
| F_4 | 2 | 1 | 6 (5) |
| | 2 | 9 | |
| | (4) | (2) | |

| | 1 | 2 | 3 | 4 | |
|---|----|----|----|----|----|
| A | 21 | 16 | 15 | 3 | 11 |
| B | 17 | 18 | 14 | 23 | 13 |
| C | 32 | 24 | 18 | 41 | 19 |
| | 6 | 10 | 12 | 15 | |

| | w_2 | |
|-------|-------|---|
| F_3 | 4 | 7 |
| F_4 | 6 | 2 |
| | 2 | 9 |
| | (2) | |

| | w_1 | w_2 | w_3 | |
|-------|-------|-------|-------|--|
| F_1 | 5 | | | |
| F_2 | 2 | 7 | 4 | |
| F_3 | 3 | 3 | 1 | |
| F_4 | 5 | 4 | 7 | |
| | 2 | 2 | 10 | |
| | 1 | 6 | 2 | |

$$\begin{aligned}
 \text{Total cost} &= (5 \times 2) + (8 \times 1) + \\
 &\quad (1 \times 4) + (2 \times 1) + \\
 &\quad (10 \times 2) + (6 \times 2) \\
 &= 10 + 8 + 28 + \\
 &\quad 2 + 20
 \end{aligned}$$