

Pertemuan 7

Lanjutan persoalan transportasi

- Tujuan :
 - Setelah mencari solusi fisibel awal
 - Selanjutnya → menggunakan metoda Multiplier

Menentukan E.V & L.V dgn metode multiplier

B.V \rightarrow yg ada isinya
 NB.V \rightarrow yg tidak ada isinya

① Hitung penurunan ongkos tiap NB.V, caranya:

| | | |
|-----------|------------|-----------|
| | $V_1 = 10$ | $V_2 = 0$ |
| $U_1 = 0$ | 5 | 3 |
| $U_2 = 7$ | X_{21} | 6 |

C_{11} above the top-right cell (3)
 C_{12} above the bottom-right cell (6)
 C_{21} above the bottom-left cell (X_{21})

Cari V_1, V_2, U_1 & U_2
 Berdasarkan B.V
 anggap $U_1 = 0$

$$\begin{aligned}
 \rightarrow U_1 + V_1 &= C_{11} \rightarrow 0 + V_1 = 10 \rightarrow V_1 = 10 \\
 U_1 + V_2 &= C_{12} \rightarrow 0 + V_2 = 0 \rightarrow V_2 = 0 \\
 U_2 + V_2 &= C_{22} \rightarrow U_2 + 0 = 7 \rightarrow U_2 = 7
 \end{aligned}$$

penurunan ongkos pd Non B.V (NB.V)

$$\begin{aligned}
 X_{21} &= C_{21} - U_2 - V_1 \\
 &= 12 - 7 - 10 \\
 X_{21} &= -5
 \end{aligned}$$

② Apakah penurunan ongkos sudah bernilai \oplus semua?
if yes then \rightarrow stop
else \rightarrow langkah ③

③ E.V \rightarrow NBV yg paling negatif (u memberikan
 \swarrow ongkos terbesar)

④ loop tertutup yg berawal & berakhir pd E.V

⑤ tiap sudut loop \sim B.V

⑥ Beri tanda $\oplus \sim$ E.V

$-$ \sim $\ominus \rightarrow$ setelah E.V

⑦ L.V \rightarrow B.V yg bertanda \ominus yg paling \swarrow ,
if ada yg sama, ms pilih salah satu salah
(kurang efektif) dengan ongkos terbesar satu

8) Var pd kotak bertanda \oplus akan \oplus dgn . L.v

Var — " — \ominus akan \ominus — " —

9) E.v jd \rightarrow B.v

L.v jd \rightarrow NBV

10) misal ada angka \emptyset

↳ tetap sbg P.v & di perhitungkan

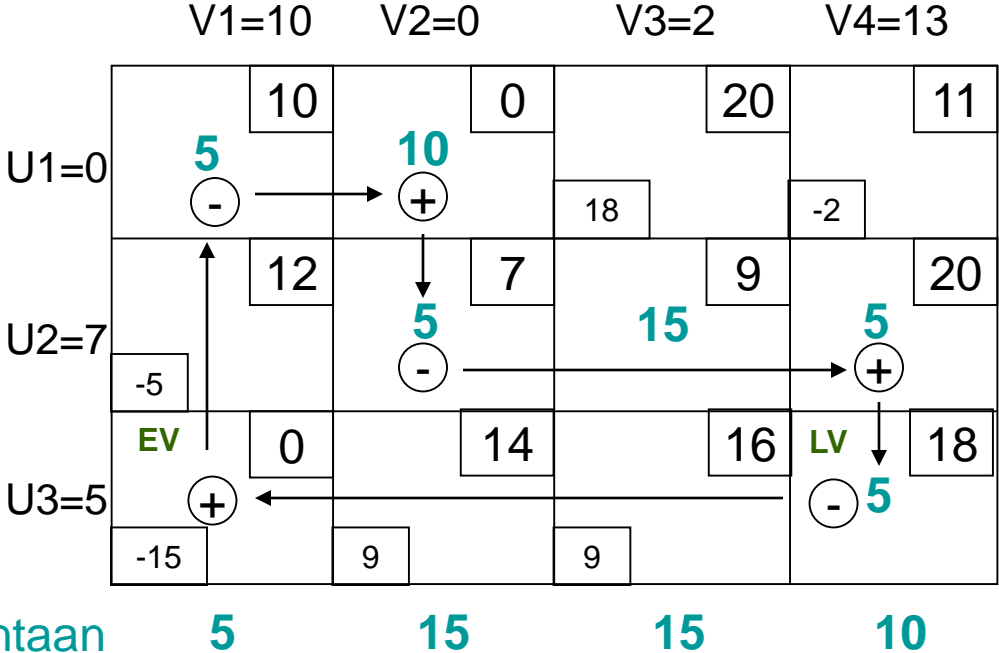
11) \square \nrightarrow dihilangkan, jd tetap sbg B.v bukan NBV
kembali ke langkah 1

Contoh

Dari solusi awal menggunakan metode pojok kiri atas

| | | Tujuan | | | | |
|------------|---|--------|----|----|----|------------|
| | | 1 | 2 | 3 | 4 | persediaan |
| Sumber | 1 | 5 | 10 | 0 | 20 | 11 |
| | 2 | 12 | 7 | 9 | 20 | 5 |
| | 3 | 0 | 14 | 16 | 18 | 5 |
| Permintaan | | 5 | 15 | 15 | 10 | |

persediaan



Menghitung penurunan ongkos tiap NBV

Dari BV ($U_i + V_j = C_{ij}$)

$$U_1 + V_1 = 10 \longrightarrow 0 + V_1 = 10 \longrightarrow V_1 = 10$$

$$U_1 + V_2 = 0 \longrightarrow 0 + V_2 = 0 \longrightarrow V_2 = 0$$

$$U_2 + V_2 = 7 \longrightarrow U_2 + 0 = 7 \longrightarrow U_2 = 7$$

$$U_2 + V_3 = 9 \longrightarrow 7 + V_3 = 9 \longrightarrow V_3 = 2$$

$$U_2 + V_4 = 20 \longrightarrow 7 + V_4 = 20 \longrightarrow V_4 = 13$$

$$U_3 + V_4 = 18 \longrightarrow U_3 + 13 = 18 \longrightarrow U_3 = 5$$

Penurunan ongkos pada NBV ($X_{ij} = C_{ij} - U_i - V_j$)

$$X_{13} = 20 - 0 - 2 = 18$$

$$X_{14} = 11 - 0 - 13 = -2$$

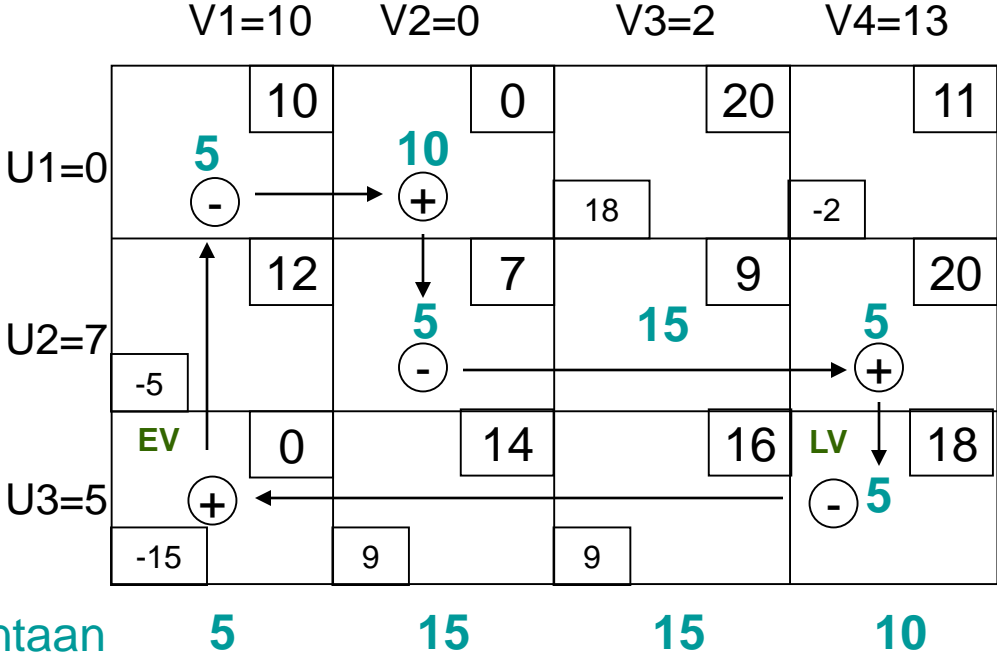
$$X_{21} = 12 - 7 - 10 = -5$$

$$X_{31} = 0 - 5 - 10 = -15$$

$$X_{32} = 14 - 5 - 0 = 9$$

$$X_{33} = 16 - 5 - 2 = 9$$

persediaan



V1=10

V2=0

V3=2

V4=13

persediaan

| | | | | | |
|--------|---------|----|---------|----|----|
| | LV | 10 | 0 | 20 | 11 |
| U1=0 | 0 - | → | 15 + | 18 | -2 |
| EV | 12 | 7 | 9 | 20 | |
| U2=7 | -5 + | ← | 0 - | 15 | 10 |
| U3=-10 | 5 | 0 | 14 | 16 | 18 |
| | | 24 | 24 | 15 | |

15

25

5

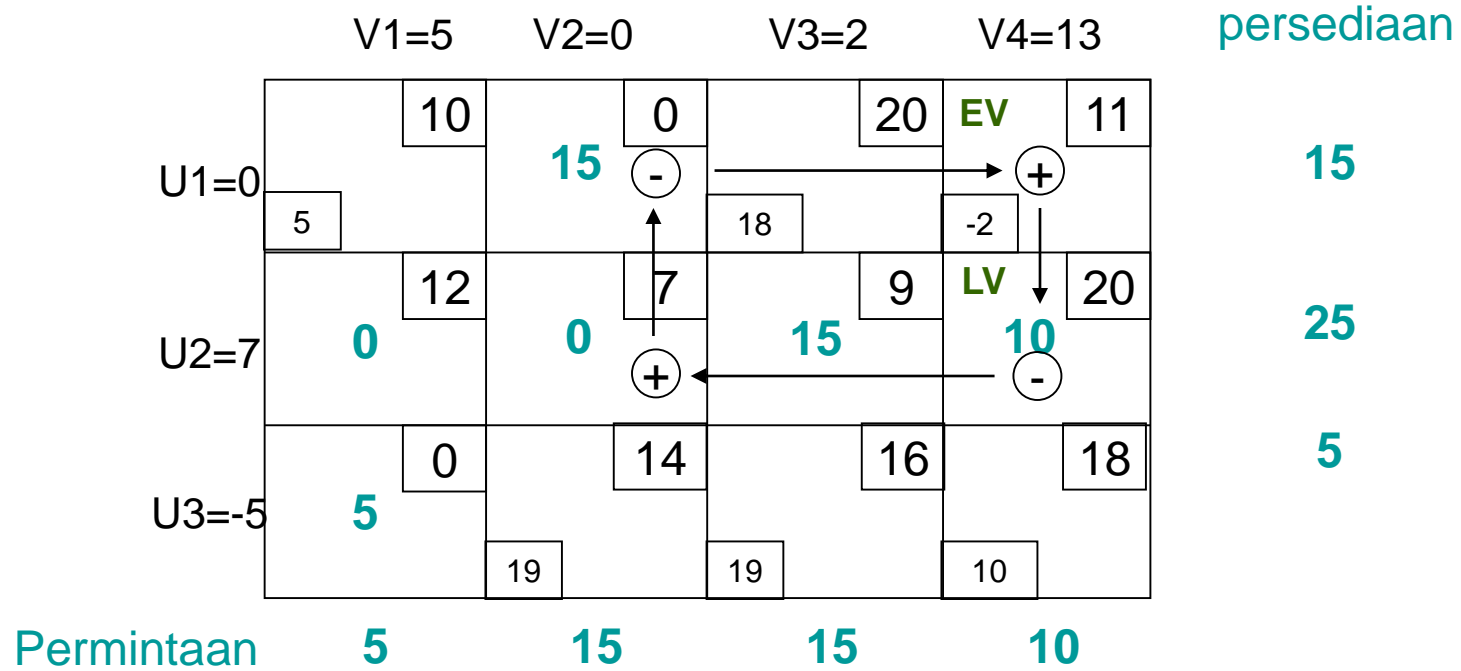
Permintaan

5

15

15

10



| | V1=5 | V2=0 | V3=2 | V4=11 | Penawaran |
|------------|---------------|----------|----------|----------|-----------|
| U1=0 | LV 10 5 | 5 0 | 18 20 | 10 11 | 15 |
| U2=7 | 0 12 | 10 7 | 15 9 | 2 20 | 25 |
| U3=-5 | 5 0 | 19 14 | 19 16 | 12 18 | 5 |
| Permintaan | 5 | 15 | 15 | 10 | |

Karena penurunan ongkos pada NBV sudah (+) semua, maka optimum.
Jadi total transportasi adalah

$$\text{Ongkos} = 5.0 + 10.11 + 10.7 + 15.9 + 5.0 + 0.12 = 315$$

Multiplier with TORA

| Iter 1 | ObjVal = | 410.00 | D1 | D2 | D3 | D4 | Supply |
|--------|----------|--------|----------|-----------|-----------|-----------|--------|
| | Name | | | | | | |
| | | | v1=10.00 | v2=0.00 | v3=2.00 | v4=13.00 | |
| S1 | u1=0.00 | | 10.00 | 0.00 | 20.00 | 11.00 | 15 |
| | | | 5 | 10 | | | |
| S2 | u2=7.00 | | 0.00 | 0.00 | -18.00 | 2.00 | 25 |
| | | | 12.00 | 7.00 | 9.00 | 20.00 | |
| S3 | u3=5.00 | | 5 | 15 | 5 | | 5 |
| | | | 5.00 | 0.00 | 0.00 | 0.00 | |
| | | | 0.00 | 14.00 | 16.00 | 18.00 | |
| | | | 15.00 | -9.00 | -9.00 | 0.00 | |
| | Demand | | 5 | 15 | 15 | 10 | |

| Iter 2 | ObjVal = | 335.00 | D1 | D2 | D3 | D4 | Supply |
|--------|----------|--------|----------|-----------|-----------|-----------|--------|
| | Name | | | | | | |
| | | | v1=5.00 | v2=0.00 | v3=2.00 | v4=13.00 | |
| S1 | u1=0.00 | | 10.00 | 0.00 | 20.00 | 11.00 | 15 |
| | | | | 15 | | | |
| S2 | u2=7.00 | | -15.00 | 0.00 | -18.00 | 2.00 | 25 |
| | | | 12.00 | 7.00 | 9.00 | 20.00 | |
| S3 | u3=5.00 | | 5 | 15 | 10 | | 5 |
| | | | -10.00 | 0.00 | 0.00 | 0.00 | |
| | | | 0.00 | 14.00 | 16.00 | 18.00 | |
| | | | 0.00 | -9.00 | -9.00 | 0.00 | |
| | Demand | | 5 | 15 | 15 | 10 | |

Multiplier with TORA

| Iter 3 | ObjVal = | 315.00 | D1 | D2 | D3 | D4 | Supply |
|--------|----------|----------|-----------|-----------|-----------|-----------|--------|
| | Name | | | | | | |
| | | | v1=-7.00 | v2=0.00 | v3=2.00 | v4=11.00 | |
| S1 | u1=0.00 | 10.00 | 0.00 | 20.00 | 11.00 | 15 | |
| | | | 5 | | 10 | | |
| | | -17.00 | 0.00 | -18.00 | 0.00 | | |
| S2 | u2=7.00 | 12.00 | 7.00 | 9.00 | 20.00 | 25 | |
| | | | 10 | 15 | | | |
| | | -12.00 | 0.00 | 0.00 | -2.00 | | |
| S3 | u3=7.00 | 0.00 | 14.00 | 16.00 | 18.00 | 5 | |
| | | 5 | | | 0 | | |
| | | 0.00 | -7.00 | -7.00 | 0.00 | | |
| | Demand | | 5 | 15 | 15 | 10 | |

PR

- Soal PR 1 dan 2 dari Pertemuan 5
- Solusi awal → pojok kiri atas
- Dilanjutkan dengan → Multiplier hingga optimum
- Jawab → manual dan dengan TORA