



Aplikasi Matriks Pada Permasalahan Ekonomi Dan Bisnis

Week 06

W. Rofianto, ST, MSi

PROYEKSI PEMILU



$$P = \begin{matrix} & \begin{matrix} \text{Propinsi} \\ 1 & 2 & 3 & 4 & 5 & 6 \end{matrix} \\ \begin{pmatrix} 0.40 & 0.35 & 0.30 & 0.50 & 0.30 & 0.36 \\ 0.42 & 0.40 & 0.25 & 0.30 & 0.30 & 0.32 \\ 0.18 & 0.25 & 0.45 & 0.20 & 0.40 & 0.32 \end{pmatrix} & \begin{matrix} A \\ B \\ C \end{matrix} \end{matrix} \quad V = \begin{pmatrix} 30,000 \\ 60,000 \\ 70,000 \\ 45,000 \\ 55,000 \\ 40,000 \end{pmatrix}$$

Berapa jumlah suara masing-masing partai?

Jumlah suara = $P \times V$

$$\begin{pmatrix} A \\ B \\ C \end{pmatrix} = \begin{pmatrix} 0.40 & 0.35 & 0.30 & 0.50 & 0.30 & 0.36 \\ 0.42 & 0.40 & 0.25 & 0.30 & 0.30 & 0.32 \\ 0.18 & 0.25 & 0.45 & 0.20 & 0.40 & 0.32 \end{pmatrix} \begin{pmatrix} 30.000 \\ 60.000 \\ 70.000 \\ 45.000 \\ 55.000 \\ 40.000 \end{pmatrix} = \begin{pmatrix} 107.400 \\ 96.900 \\ 95.700 \end{pmatrix}$$

BRAND SWITCHING ANALYSIS



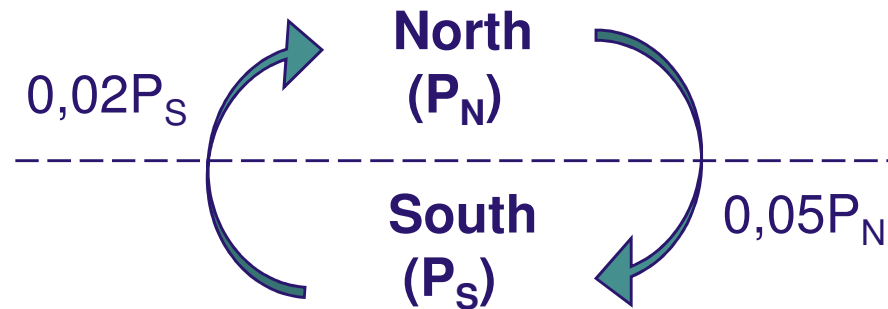
$$\begin{matrix} & \mathbf{A} & \mathbf{B} \\ \mathbf{A} & \begin{pmatrix} p_{AA} & p_{AB} \end{pmatrix} \\ \mathbf{B} & \begin{pmatrix} p_{BA} & p_{BB} \end{pmatrix} \end{matrix} \quad T = \begin{pmatrix} 0.80 & 0.20 \\ 0.10 & 0.90 \end{pmatrix} \quad S = (0.40 \quad 0.60)$$

$$\mathbf{S}_1 = \mathbf{ST}$$

$$\begin{aligned} S_1 &= (0.40 \quad 0.60) \begin{pmatrix} 0.80 & 0.20 \\ 0.10 & 0.90 \end{pmatrix} \\ &= [0.40(0.80) + 0.60(0.10) \quad 0.40(0.20) + 0.60(0.90)] \\ &= (0.38 \quad 0.62) \end{aligned}$$

$$S_n = \overbrace{STTT \dots T}^n = ST^n$$

POPULATION MIGRATION-EQUILIBRIUM CONDITIONS



$$S = \begin{pmatrix} \text{To north} & \text{To south} \\ \text{From north} & 0.95 & 0.05 \\ \text{From south} & 0.02 & 0.98 \end{pmatrix}$$

$$PS = P'$$

$$(P_N \quad P_S) \begin{pmatrix} 0.95 & 0.05 \\ 0.02 & 0.98 \end{pmatrix} = (P'_N \quad P'_S) \longrightarrow$$

Ekuilibrimum

$$0.95P_N + 0.02P_S = P_N$$

$$0.05P_N + 0.98P_S = P_S$$

Apabila jumlah total populasi adalah 70 juta jiwa, berapa komposisi keseimbangan populasi?

$$0.95P_N + 0.02P_S = P_N \longrightarrow P_N = 20 \quad P_S = 50$$

$$P_N + P_S = 70$$

$$(20 \quad 50) \begin{pmatrix} 0.95 & 0.05 \\ 0.02 & 0.98 \end{pmatrix} = (19+1 \quad 1+49) = (20 \quad 50)$$

INPUT-OUTPUT ANALYSIS



Wassily Leontief

$$\begin{array}{c}
 \text{Supplier} \\
 \begin{matrix} 1 \\ 2 \\ 3 \end{matrix}
 \end{array}
 \begin{array}{c}
 \text{User} \\
 \begin{matrix} 1 & 2 & 3 \end{matrix}
 \end{array}
 \begin{pmatrix}
 0.3 & 0.3 & 0.2 \\
 0.1 & 0.2 & 0.3 \\
 0.2 & 0.1 & 0.4
 \end{pmatrix} = A$$

Industry Output = Interindustry Demand + nonindustri demand

$$\begin{array}{l}
 x_1 = 0.3x_1 + 0.3x_2 + 0.2x_3 + d_1 \\
 x_2 = 0.1x_1 + 0.2x_2 + 0.3x_3 + d_2 \\
 x_3 = 0.2x_1 + 0.1x_2 + 0.4x_3 + d_3
 \end{array}
 \quad \longrightarrow \quad
 \begin{array}{l}
 0.7x_1 - 0.3x_2 - 0.2x_3 = d_1 \\
 -0.1x_1 + 0.8x_2 - 0.3x_3 = d_2 \\
 -0.2x_1 + 0.1x_2 + 0.6x_3 = d_3
 \end{array}$$

$$\mathbf{X} = \mathbf{AX} + \mathbf{D}$$

INPUT-OUTPUT ANALYSIS



$$X = AX + D$$

$$X - AX = D$$

$$IX - AX = D$$

$$(I - A)X = D$$

$$(I - A)^{-1}(I - A)X = (I - A)^{-1}D$$

$$IX = (I - A)^{-1}D$$

$$X = (I - A)^{-1}D$$

INPUT-OUTPUT ANALYSIS

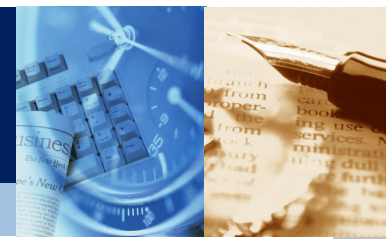


$$A = \begin{pmatrix} 0.3 & 0.3 & 0.2 \\ 0.1 & 0.2 & 0.3 \\ 0.2 & 0.1 & 0.4 \end{pmatrix} \quad \begin{array}{l} d_1 = \$50,000,000 \\ d_2 = \$30,000,000 \\ d_3 = \$60,000,000 \end{array}$$

$$(I-A)^{-1} = \begin{pmatrix} 1.837 & 0.816 & 1.020 \\ 0.490 & 1.551 & 0.939 \\ 0.694 & 0.531 & 2.163 \end{pmatrix} \rightarrow X = \begin{pmatrix} 1.837 & 0.816 & 1.020 \\ 0.490 & 1.551 & 0.939 \\ 0.694 & 0.531 & 2.163 \end{pmatrix} \begin{pmatrix} 50,000,000 \\ 30,000,000 \\ 60,000,000 \end{pmatrix}$$

$$= \begin{pmatrix} 177,530,000 \\ 127,370,000 \\ 180,410,000 \end{pmatrix}$$

		User		
		1	2	3
	1	53.259	38.211	36.082
Supplier	2	17.753	25.474	54.123
	3	35.506	12.737	72.164



Diketahui matrix input-output dua industri adalah sebagai berikut :

$$A = \begin{pmatrix} 0.4 & 0.3 \\ 0.2 & 0.3 \end{pmatrix}$$

Jika demand non industri masing-masing adalah Rp. 50.000.000 dan Rp. 30.000.000, tentukanlah :

- a. Tingkat output keseimbangan untuk masing-masing industri
 - b. Besarnya demand inter-industri pada kedua industri tersebut
-

PRODUCTION PLANNING



$$S = \begin{matrix} & \text{Kota} & & & & & & \\ & 1 & 2 & 3 & & & & \\ \begin{pmatrix} 500 & 200 & 350 \\ 400 & 300 & 100 \\ 250 & 425 & 50 \\ 100 & 150 & 350 \\ 200 & 175 & 225 \end{pmatrix} & 1 & 2 & 3 & 4 & 5 & \text{Produk} & \end{matrix}$$

$$R = \begin{matrix} & \text{Komponen} & & & & & & \\ & 1 & 2 & 3 & 4 & & & \\ \begin{pmatrix} 1 & 0 & 2 & 0 \\ 1 & 1 & 1 & 0 \\ 2 & 1 & 0 & 3 \\ 0 & 2 & 1 & 1 \\ 1 & 1 & 3 & 1 \end{pmatrix} & 1 & 2 & 3 & 4 & 5 & \text{Produk} & \end{matrix}$$

$$P = \begin{matrix} & \text{Sumber} & \text{Daya} & & & & & \\ & 1 & 2 & 3 & 4 & 5 & & \\ \begin{pmatrix} 2 & 0 & 1 & 2 & 3 \\ 1 & 3 & 2 & 5 & 1 \\ 0 & 2 & 1 & 4 & 2 \\ 0 & 4 & 1 & 1 & 6 \end{pmatrix} & 1 & 2 & 3 & 4 & 5 & \text{Komponen} & \end{matrix}$$

$$C = (\$25 \quad \$15 \quad \$30 \quad \$10 \quad \$8)$$

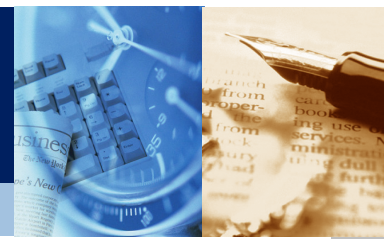
PRODUCTION PLANNING



Perhitungan jumlah permintaan total untuk masing-masing produk

$$\begin{aligned} D &= S \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix} \\ &= \begin{pmatrix} 500 & 200 & 350 \\ 400 & 300 & 100 \\ 250 & 425 & 50 \\ 100 & 150 & 350 \\ 200 & 175 & 225 \end{pmatrix} \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix} \\ &= \begin{pmatrix} 1,050 \\ 800 \\ 725 \\ 600 \\ 600 \end{pmatrix} \end{aligned}$$

PRODUCTION PLANNING



Perhitungan jumlah kebutuhan tiap komponen

$$\begin{aligned} C_r &= D^T R \\ &= (1,050 \quad 800 \quad 725 \quad 600 \quad 600) \begin{pmatrix} 1 & 0 & 2 & 0 \\ 1 & 1 & 1 & 0 \\ 2 & 1 & 0 & 3 \\ 0 & 2 & 1 & 1 \\ 1 & 2 & 3 & 1 \end{pmatrix} \\ &= (3,900 \quad 3,925 \quad 5,300 \quad 3,375 \quad) \end{aligned}$$

PRODUCTION PLANNING



Perhitungan jumlah kebutuhan sumber daya (*resources*)

$$R_r = C_r P$$

$$\begin{aligned} &= (3,900 \quad 3,925 \quad 5,300 \quad 3,375) \begin{pmatrix} 2 & 0 & 1 & 2 & 3 \\ 1 & 3 & 2 & 5 & 1 \\ 0 & 2 & 1 & 4 & 2 \\ 0 & 4 & 1 & 1 & 6 \end{pmatrix} \\ &= (11,725 \quad 35,875 \quad 20,425 \quad 52,000 \quad 46,475) \end{aligned}$$

Perhitungan biaya total untuk memproduksi seluruh barang

$$TC = R_r C^T$$

$$= (11,725 \quad 35,875 \quad 20,425 \quad 52,000 \quad 46,475) \begin{pmatrix} 25 \\ 15 \\ 30 \\ 10 \\ 8 \end{pmatrix}$$

A word cloud centered around the English phrase "THANK YOU" in large, bold black letters. Surrounding it are various translations of "thank you" in many languages, including:
- Spanish: GRACIAS, GRACIAS
- Arabic: SHUKRIYA, SHUKRIYA
- Chinese: 谢谢 (TIE TIE)
- Japanese: ありがとうございます (ARIGATO)
- Hindi: धन्यवाद (DANKSCHEEN)
- Russian: СПАСИБО (SUSPAXAR)
- Korean: 감사하요 (GANSASHITA)
- Indonesian: TERIMA KASIH (TERIMAKASIH)
- Vietnamese: CẢM ƠN (CAN ON)
- Thai: ขอบคุณ (KHA TU)
- Tagalog: MARAMING SALAMUNAN (MARSHAMUNAN)
- Malay: TERIMA KASIH (TERIMAKASIH)
- Persian: تشکر (TASHAKKUR)
- Bengali: ধন্যবাদ (DANKSCHEEN)
- Urdu: شکریہ (SHUKRIYA)
- Turkish: TEŞEKKÜR (TASHAKKUR)
- French: MERCI (MERCY)
- German: DANKE (DANKSCHEEN)
- Italian: GRAZIE (GRAZIE)
- Polish: DZIĘKUJĘ (DANKSCHEEN)
- Czech: DEKUJU (DANKSCHEEN)
- Slovak: ĎAKUJEM (DANKSCHEEN)
- Hungarian: KÖSZÖNET (KOSZONET)
- Romanian: MULȚUMESC (MULSUMESC)
- Bulgarian: БЛАГОДАРЯВА (BLAGODARYAVA)
- Czech: DĚKUJEM (DANKSCHEEN)
- Slovak: ĎAKUJEM (DANKSCHEEN)
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