

## Input Data (Quarter-1)

- No. of Suppliers = 03
- No. of Ports = 02
- No. of Warehouses = 03
- No. of Customers = 02
- No. of Transportation Modes = 03 (Sea, Rail, Road)
- Purchasing Cost for each supplier (\$/kg)
  - $C_p^1 = 0.68, 0.715, 0.76$
  - $C_p^2 = 0.79, 0.825, 0.87$
  - $C_p^3 = 0.65, 0.695, 0.73$
- Ordering Cost for each supplier (\$)
  - $O_1 = 156.2, 158.2, 160.2$
  - $O_2 = 140.7, 142.7, 144.7$
  - $O_3 = 163.8, 165.8, 167.8$
- Inventory Holding Cost (\$/kg)
  - $H_o = 0.026, 0.036, 0.046$
- Transportation Cost (\$/km)
  - $TC_{Sea} = 0.21, 0.41, 0.61$
  - $TC_{Rail} = 0.53, 0.73, 0.93$
  - $TC_{Road} = 0.75, 0.95, 1.15$
- Transfer Cost matrix (\$/kg):  $TrC_{mn}$  = Transfer Cost from mode “ $m$ ” to mode “ $n$ ”

	Sea	Rail	Road
Sea	1.2	0.9	0.7
Rail	0.9	1.0	1.1
Road	0.7	1.1	0.6

- Custom Clearance Cost (\$/kg):  $CC_{ij}$  = Custom Clearance Cost while moving from supplier “ $i$ ” to port “ $j$ ”  
 $CC_{11} = 1.15 \times C_p^1$

$$CC_{21} = 1.15 \times C_p^2$$

$$CC_{31} = 1.15 \times C_p^3$$

- Transfer Time Matrix (h/Container):  $TrT_{mn}$  = Transfer Time from mode “ $m$ ” to mode “ $n$ ”

	Sea	Rail	Road
Sea	0.7	0.17	0.17
Rail	0.17	0.4	0.12
Road	0.17	0.12	0.1

- Custom Clearance Time (h/Container):  $CCT_{ij}$  = Custom Clearance Time from supplier “ $i$ ” to port “ $j$ ”

$$CCT_{11} = 4$$

$$CCT_{21} = 4$$

$$CCT_{31} = 4$$

- Maximum Capacity of supplier “ $i$ ” (kg):  $S_i$  = Maximum Capacity of  $i^{th}$  supplier

$$S_1 = 24,00,00, 26,00,00, 28,00,00$$

$$S_2 = 23,00,00, 25,00,00, 27,00,00$$

$$S_3 = 21,00,00, 23,00,00, 25,00,00$$

- Capacity of warehouse “ $k$ ” (kg):  $CAP_{wk}$  = Capacity of  $k^{th}$  warehouse

$$CAP_{w1} = 30,50,00, 32,50,00, 34,50,00$$

$$CAP_{w2} = 34,50,00, 36,50,00, 38,50,00$$

$$CAP_{w3} = 38,50,00, 40,50,00, 42,50,00$$

- Velocity of mode “ $m$ ”: (Adapted from [74])

Mode	Velocity (km/h)
Sea	35
Rail	60
Road	90

- Capacity of mode “ $m$ ”:

Mode	Capacity/Carrier (kg)
Sea	300,000,000*
Rail	300,000**
Road	20,000

\*Panamax ship having an average capacity of 15,000 TEUs.

\*\*15 TEUs each having a capacity of 800 bags (25 kg/bag) per container are permissible per train.

- CO<sub>2</sub> emissions (gm/km) (Adapted from [26])

For Sea: 6.04

For Rail: 17

For Road: 50

- Demand of Customers (kg)

D<sub>1</sub> = 22,75,00, 24,00,00, 25,35,00

D<sub>2</sub> = 32,20,00, 35,00,00, 37,50,00

- Acceptable Quality Limit of supplier “*i*” (kg)

$\alpha_1 = 0.04$

$\alpha_2 = 0.04$

$\alpha_3 = 0.03$