Assignment

Linear Programming

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Quantitative
Management
Modelling

1. $P(c,m) = 32c + 24m$

P = Total profit as a function
c = No. of bags colligate
m = No. of bags minis

$0 \leq c \leq 1000$, $0 \leq m \leq 1200$

Total Nylon = 5000 Sqft

Total labor hours = $35 \times 40 = 1400$ hr

↓ No. of available labors

→ No. of hours each labour work

c → requires 3Sqft Nylon
m → requires 2Sqft Nylon

$$3c + 2m \leq 15000$$

c → Each unit it takes 45 min $\Rightarrow \frac{45}{60} = \frac{3}{4}$
m → Each unit it takes 40 min $\Rightarrow \frac{40}{60} = \frac{2}{3}$

$$\frac{3}{4}c + \frac{2}{3}m \leq 1400$$

Constraints :-

$$3c + 2m \leq 5000$$

$$\frac{3}{4}c + \frac{2}{3}m \leq 1400$$

Decision Variables :-

P :- Total profit

c :- no. of collegiate bags

m :- no. of bags minis

Objective function :-

maximize profit

$P(c,m) = 32c + 24m$

where cm are variables, since we can't make negative backpack both cm are greater than having sales limit

$0 \leq c \leq 1000$

$0 \leq m \leq 12000$

(2) Decision variables

Let Sij be no. of units of Size

S = no. of units

i = no. of Plant (1, 2, 3)

j = holds the plant of Small, medium, large

P = has to be maximised

Objective function

$P = 420(S_1 + S_2 + S_3) + 360(S_1 + S_2 + S_3) +$

$300(S_1 + S_2 + S_3)$

Constraints

$$S_{1L} + S_{1M} + S_{1S} \leq 750 \rightarrow \text{Plant 1}$$

$$S_{2L} + S_{2M} + S_{2S} \leq 900 \rightarrow \text{Plant 2}$$

$$S_{3L} + S_{3M} + S_{3S} \leq 450 \rightarrow \text{Plant 3}$$

Storage limits

$$20 S_{1L} + 15 S_{1M} + 12 S_{1S} \leq 13000$$

$$20 S_{2L} + 15 S_{2M} + 12 S_{2S} \leq 12000$$

$$20 S_{3L} + 15 S_{3M} + 12 S_{3S} \leq 5000$$

Sales forecast

$$S_{1L} + S_{1M} + S_{1S} \leq 900$$

$$S_{2L} + S_{2M} + S_{2S} \leq 1200$$

$$S_{3L} + S_{3M} + S_{3S} \leq 750$$

Percentage to avoid layoff :-

$$= \frac{S_{1L} + S_{1M} + S_{1S}}{750} \times 100$$

$$= \frac{S_{2L} + S_{2M} + S_{2S}}{900} \times 100$$

$$= \frac{S_{3L} + S_{3M} + S_{3S}}{750} \times 100$$