1)

Let

Decision Variables:

CB=Number of Collegiate Bags

MB= Number of Mini Bags

PR=Total Profit

Where Total Profit is Objective Function

Objective Function:

Maximize Profit

PR (CB, MB) =32CB+24MB

$0 \leq CB \leq 1000$(Since we don't have negative Bag)

$0 \leq MB \leq 1200$(Since we don't have negative Bag)

Constraints:

There are 2 Constraints

1)Material (Nylon)

CB<- requires 3 sqft Nylon

MB<- requires 2 sqft Nylon

$3CB+2MB \leq 5000$

2)Labour

35*40=1400 Hours (Number of available Hours * Number of hours each Labour works)

Mathematical Formulation:

PR (CB, MB) =32CB+24MB

CB=Number of Collegiate Bags

MB= Number of Mini Bags

PR=Total Profit/Objective Function

$0 \leq CB \leq 1000$(Since we don't have negative Bag)

$0 \leq MB \leq 1200$(Since we don't have negative Bag)

Total Nylon given=5000 Sqft

Total Labour hours that are required=35*40=1400 hrs

Consider,

CB<- requires 3 sqft Nylon used by Collegiate

MB<- requires 2 sqft Nylon used by mini

$3CB+2MB \leq 5000$

Which calculating labour costs of Collegiate:

Each labour unit takes around 45 minutes: 45/60= 3/4

Which calculating labour costs of Mini:

Each labour unit takes around 40 minutes: 40/60= 2/3

$(3/4)\ CB+(2/3)\ MB \leq 1400$

2)

Decision Variables:

Let $PS_{ij}$ be the number of units of plant sizes.

PS=number of plant units

i= number of plants (1,2,3)

j=number that holds the plant of sizes (Small(S), Medium(M), Large(L)).

M=Maximized value

Applying linear programming model:

Objective Function:

M=420(PS1L+PS2L+PS3L) +360(PS1M+PS2M+PS3M) +300(PS1S+PS2S+PS3S)

Constraints:

Sizes:

(PS1L+PS2M+PS3S) ≤750 which is plant 1

(PS2L+PS2M+PS3S) ≤900 which is plant 2

(PS1L+PS2M+PS3S) ≤450 which is plant 3

Storage Units:

20 PS1L+15PS1M+12PS1S ≤ 13000

20 PS2L+15PS2M+12PS2S ≤ 12000

$$20\ PS3L+15PS3M+12PS3S \leq 5000$$

Sales Forecast:

$$PS1L+PS1M+PS1S \leq 900$$

$$PS2L+PS2M+PS2S \leq 1200$$

$$PS3L+PS3M+PS3S \leq 750$$

Percentage to avoid the Layoff:

$$((PS1L+PS1M+PS1S)/750)*100$$

$$((PS2L+PS2M+PS2S)/900)*100$$

$$((PS3L+PS3M+PS3S)/450)*100$$