LINEAR PROGRAMMING MODEL

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LINEAR PROGRAMMING MODEL:

 Objective Function:

Our goal is to maximize (Smax) the overall profit:

Smax = 420pA1+420pA2+420pA3+360pB1+ 360pB2+ 360pB3+ 300pC1+ 300pC2+300pC3 respectively.

 Constraints: EXCESS CAPACITY: Excess capacity for Plant 1: pA1 + pB1 + pC1 <= 750 Excess capacity for Plant 2: pA2 + pB2 + pC2 <= 900 Excess capacity for Plant 3: pA3 + pB3 + pC3 <= 450

RESTRICTION ON SALE PREDICTIONS: Large sales prediction: pA1 + pB2 + pC3 < = 900 Medium sales prediction: pA1 + pB2 + pC3 <= 1200 Small sales prediction: pA1 + pB2 + pC3 <= 750

STORAGE VOLUME: Storage volume in plant 1: 20pA1+15pB1+12pC1 <= 13000 Storage area in plant 2: 20pA2 + 15pB2 + 12pC2 <= 12000. Storage space in plant 3: 20pA3 + 15pB3 + 12pC3 <= 5000.

Given that each plant should consume an equal percentage of its production unit. 900(pA1+ pB1+ pC1) – 750(pA2+ pB2+ pC2) = 0 450(pA2+ pB2+ pC2) – 900(pA3+ pB3+ pC3) = 0 450(pA1+pB1+pC1) – 750 (pA3+pB3+pC3)=0

NON-NEGATIVITY: pA1, pA2, pA3, pB1, pB2, pB3, pC1, pC2, pC3 >= 0:( non-Negativity)

#installed the library lpsolve and call it, to run the code  
library(lpSolve)  
  
#defining the objective function:  
objective=c(420,360,300,  
 420,360,300,  
 420,360,300)  
  
#the constraints:  
constraints=matrix(c(1,1,1,0,0,0,0,0,0,  
 0,0,0,1,1,1,0,0,0,  
 0,0,0,0,0,0,1,1,1,  
 1,0,0,1,0,0,1,0,0,  
 0,1,0,0,1,0,0,1,0,  
 0,0,1,0,0,1,0,0,1,  
 20,15,12,0,0,0,0,0,0,  
 0,0,0,20,15,12,0,0,0,  
 0,0,0,0,0,0,20,15,12),nrow =9,byrow = TRUE)  
  
#defining the directions of inequality constraints  
directions=c("<=",  
 "<=",  
 "<=",  
 "<=",  
 "<=",  
 "<=",  
 "<=",  
 "<=",  
 "<=")  
  
#setting up the right hand side values  
values=c(750,  
 900,  
 450,  
 900,  
 1200,  
 750,  
 13000,  
 12000,  
 5000)  
  
#the value of S  
lp("max",objective,constraints,directions,values)

## Success: the objective function is 708000

#final solution  
lp("max",objective,constraints,directions,values)$solution

## [1] 350.0000 400.0000 0.0000 0.0000 400.0000 500.0000 0.0000 133.3333  
## [9] 250.0000