Max : $\sum_{t=1}^{N_t}[(p_t . Q_t . I_t) - C(Q_t) . I_t]$

$C(Q_t) = c_0 u_t + \sum_j c_j . Qb_{j,t} + cost_t^{SU} + cost_t^{SD}$ ∀ t

محدودیت های فنی

1) $Qb_{j,t} \leq Z_j \_ Z_{j-1}$ ∀ t , j=2, …, N_j
2) $Qb_{j,t} \geq Z_j - Z_{j-1}$ - M . $(1 - b_{j+1,t})$ ∀ t , j=2, …, N_j
3) $Qb_{1,t} \leq Z_1 - z^{min}$ ∀ t
4) $\varepsilon . Qb_{j,t} \leq b_{j,t} \leq M . Qb_{j,t}$ ∀ t , j
5) $Q_t = \sum_j Qb_{j,t} + z^{min} . u_t$ ∀ t

6) $cost_t^{SU} \geq c^{SU} (u_t - u_{t-1})$ t=2, …, N_T
7) $cost_t^{SD} \geq c^{SD} (u_{t-1} - u_t)$ t=2, …, N_T
8) $cost_1^{SU} \geq c^{SU} (u_1 - u^0)$
9) $cost_1^{SD} \geq c^{SD} (u^0 - u_1)$
10) $Q_{t+1} - Q_t \leq R^{UP} u_t + R^{SU} (1 - u_t)$ t=1, …, N_T -1
11) $Q_t - Q_{t+1} \leq R^{down} u_{t+1} + R^{SD} (1 - u_{t+1})$ t=1, …, N_T -1

12) $\sum_{t=1}^{L}(1 - u_t) = 0$
13) $\sum_{k=t}^{t+L^{min}-1}(1 - u_k) \geq L^{min} (u_{t-1} - u_t)$ ∀ t=L+1 , … , $N_T - L^{min}$ +1

14) $\sum_{k=t}^{N_T} u_k \geq (N_T - t) (u_{t-1} - u_t)$ ∀ t= $N_T - L^{min}$ +2 , … , N_T
15) $\sum_{t=1}^{K} u_t = 0$
16) $\sum_{k=t}^{t+K^{min}-1} u_k \geq K^{min} (u_t - u_{t-1})$ ∀ t=K+1 , … , $N_T - K^{min}$ +1
17) $\sum_{k=t}^{N_T}(1 - u_k) \geq (N_T - t) (u_{t-1} - u_t)$ ∀ t= $N_T - L^{min}$ +2 , … , N_T

18) L = max { 0 , min $\{N_T , (k^{min} - L^0) u^0\}$ }

19) K = max { 0 , min {N_T , (L^{min} - K^0)(1- u^0) }}

20) u ϵ {0,1}

21) M. I_t + $p_t \geq mcp_t^R$ ∀ t

22) p_t - M (1-I_t) $\leq mcp_t^L$ ∀ t

Desision Variables:

Q_t

u_t

$Qb_{j,t}$

I_t : (0,1)

Parameters:

p_t

mcp_t^R

mcp_t^L

M:عددی بزرگ

c_0=16.45

z^{min} = 60

z^{max}= 140

L^{min} = 1

K^{min} = 1

u^0=1

R^{UP}=780

R^{down}=780

R^{SU}=780

R^{SD}=780

c^{SU}= 36.8

c^{SD}= 36.8

L^0= 2

K^0= 0

Z_1= 70

Z_2= 80

Z_3= 90

Z_4= 100

Z_5= 110

Z_6=120

Z_7= 130

Z_8= 140

c_1= 145381

c_2= 150500

c_3= 155618

c_4= 160737

c_5= 165856

c_6= 170975

c_7= 176093

c_8= 181212