Objective Functions:

$$Min\ \ obj1: \sum_{t\in T}\sum_{j\in J}\sum_{p\in P} hc_{jp} S_{jpt} + \sum_{j\in J} F_j A_j + \sum_{r\in R}\sum_{t\in T}\sum_{v\in V}\sum_{h\in H}\sum_{k\in H} d_{hk} tc_{hk} X_{hkvrt} + \sum_{t\in T}\sum_{v\in V} vc.NV_{vt} + \sum_{j\in J}\sum_{t\in T} z_{jpt}\, oc_{jp} \quad (1)$$

$$Min\ \ obj2: \sum_{j\in J}\sum_{k\in H}\sum_{v\in V}\sum_{r\in R}\sum_{t\in T}\left(1576 - 17.6u + 0.00117u^3 + 36076\frac{1}{u^2}\right).X_{jkvrt}.d_{jk} \quad (2)$$

$$Min\ \ obj3: \sum_{j\in J}\sum_{k\in H}\sum_{v\in V}\sum_{r\in R}\sum_{t\in T} e^{(0.1929169(u-Av)-0.0024244(u-Av)^2)}.X_{jkvrt} \quad (3)$$

s.t:

$$\sum_{j\in J} B_{jk} = 1 \qquad \forall k \in K \qquad (4)$$

$$\sum_{r\in R}\sum_{h\in H}\sum_{v\in V} X_{hkvrt} = 1 \qquad \forall t \in T, k \in K \qquad (5)$$

$$\sum_{j\in J}\sum_{k\in K} X_{jkvrt} \le 1 \qquad \forall t \in T, v \in V, r \in R \qquad (6)$$

$$\sum_{k\in H} X_{khvrt} - \sum_{k\in H} X_{hkvrt} = 0 \qquad \forall h \in H, v \in V, t \in T, r \in R \qquad (7)$$

$$\sum_{r\in R}\sum_{k\in H}\sum_{h\in H} \frac{X_{khvrt}.d_{hk}}{u} \le T_{\max} \qquad \forall v \in V, t \in T \qquad (8)$$

$$Nvr_{vr+1t} \le Nvr_{vrt} \qquad \forall \mathrm{k}, h \in H, v \in V, t \in T, r \in R/\{\max R\} \qquad (9)$$

$$\sum_{h\in H} X_{jhvr+1t} \le \sum_{h\in H} X_{jhvrt} \qquad \forall v \in V, \mathrm{j} \in \mathrm{J}, t \in T, r \in R/\{\max R\} \qquad (10)$$

$$\sum_{h\in H}\sum_{\mathrm{j}\in \mathrm{J}} X_{jhvrt} \le M.Nvr_{vrt} \qquad \forall v \in V, t \in T, r \in R \qquad (11)$$

$$Nvr_{vrt} \le Nv_{vt} \qquad \forall v \in V, t \in T, r \in R \qquad (12)$$

$$\sum_{h\in H} X_{khvrt} + \sum_{h\in H} X_{jhvrt} - B_{jk} \le 1 \qquad \forall v \in V, \mathrm{j} \in \mathrm{J}, \mathrm{k} \in \mathrm{K}, t \in T, r \in R \qquad (13)$$

$$M_{kvrt} - M_{hvrt} + |\mathrm{K}|X_{khvrt} \le |\mathrm{k}| - 1 \qquad \forall k, \mathrm{h} \in \mathrm{K}, v \in V, t \in T, r \in R \qquad (14)$$

$$S_{jpt} = S_{jpt-1} - \sum_{\mathrm{k}\in \mathrm{K}} D_{kpt-1}.B_{jk} + or_{jpt} \qquad \forall j \in J, p \in P, t \in T/\{1\} \qquad (15)$$

$$S_{jp1} = 0 \qquad \forall j \in J, p \in P \qquad (16)$$

$$\sum_{h\in H}\sum_{\mathrm{k}\in \mathrm{K}} \left(\sum_{p\in P} D_{kpt} X_{hkvrt}\, \mathrm{G}_p\right) \le CaV \qquad \forall v \in V, r \in R, t \in T \qquad (17)$$

$$\sum_{p\in P} (or_{jpt} + s_{jpt-1}) G_p \le ca_j.A_j \qquad \forall j \in J, t \in T/\{1\} \qquad (18)$$

$$\sum_{p\in P} (or_{jp1} G_p) \le ca_j.A_j \qquad \forall j \in J \qquad (19)$$

$$or_{jpt} \le z_{jpt} \qquad \forall j \in J, t \in T \qquad (20)$$

$$B_{jk}, \mathrm{A}_j, X_{hkvrt} \in \{0,1\} \qquad \forall t \in T, p \in P, v \in V, r \in R \qquad (21)$$