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(1)

W_i = no of workers in ith month
$W_0 = 30$
x_i = no of tapets during ith month
O_i = no of tapets made in month i
h_i, f_i = no of workers hired & fired, at begning of ith month
S_i = no of stored tapets out of month i
$S_0 = 0$

$W_i, x_i, O_i, h_i, f_i, S_i \geq 0$
$i = 1 \ldots 12$

total tapets made in i month with overtime exclusive
$x_i = 20W_i + O_i$

workers may be hired fired every month so W changes;
$\therefore W_i = W_{i-1} + h_i - f_i$

at the end of a month Carpets stored = amount made + amount supplied + starting amount

$$s_i = s_{i-1} + x_i - d_i$$

Overtime is definite $o_i \leq 6w_i$

To minimise cost, z

$$Z = 2000 \sum_i w_i + 320 \sum_i h_i + 400 \sum_i f_i$$

$$+ 8 \sum_i s_i + 180 \sum_i o_i$$

(2)

Kansas	15	} producer
Mexico	8	
NY	10	} consumer
Cal.	13	

	NY	Cal
~~mexico~~ Kansas	$ ~~4~~ 2	$ 3
mexico	$ ~~4~~	$ 1

minimise, $Z = 4x_{MN} + 1x_{MC} + 2x_{KN} + 3x_{KC}$

MN = mexico to ~~neg~~ newyork
MC = mexico to Caliyornia
KN = Kansas to newyork
KC = Kansas to Caliyornia

Kansas | #2 |

minimise, $Z = 4x_{MN} + 1x_{MC} +$

Subject to

$$x_{KN} + x_{KC} = 15$$
$$x_{MN} + x_{MC} = 8$$

$$x_{MN} + x_{KN} = 10$$
$$x_{MC} + x_{KC} = 13$$

To obtain ~~ot~~ initial feasibility solution using northwest corner method

from \ to	NY	Cal	Supply
Kansas	10 [2]	5 [3]	15
mexico	[4]	8 [1]	8
demand	10	13	

// initial feasibility solution

$X_{KNY} = 10$
$X_{KC} = 5$
$X_{MC} = 8$

$Z = 4(0) + 1(8) + 2(10)$
$+ 5(3)$
$= \$43$

next is to solve the model for optimal solution (minimum total cost) using the Modified distribution method (MODI)

u_i	V_j to / from	V_N = NY		V_c Cal		Supply
u_K =	Kansas	10	L2	5	L3	15
u_m =	mexico		L4	8	L1	8
	demand	10		13		

$$u_i + V_j = C_{ij}$$

$x_{KN} : u_K + V_N = 2$

$x_{KC} : u_K + V_C = 3$

$x_{mc} : u_m + V_c = 1$

3 eqn

4 unknowns.

$x_{KN} : u_K + V_N = 2$

let $u_K = 0$

$x_{KN} : V_N = 2$

$x_{KC} : u_K + V_c = 3$

$V_c = 3$

$x_{mc} : u_m + V_c = 1$

~~$V_c = 1 - u_m = 1$~~

$u_m = 1 - V_c = 1 - 3 = -2$

		$V_N = 2$	$V_C = 3$	Supply
$U_K = 0$	Kansas	10 [2]	5 [3]	15
$U_M = -2$	mexico	[4]	8 [1]	8
	demand	10	13	

To evaluate unallocated (empty cell)

$$C_{ij} - U_i + V_j = K_{ij}$$

$$X_{mn} : K_{mn} = C_{mn} - U_m - V_n$$
$$= 4 + 2 - 2$$
$$= 4$$

* Since the value is non negative
Solution is optimal
i.e minimal cost = $43

Kansas supplies 10 to New york
Kansas supplies 5 to California
mexico supplies 0 to New york
mexico supplies 8 to California