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Operation Research

Topic :- Transportation Problem

Procedure for solving Transportation problem -

Step 1. Determination of the initial feasible solution (VAM) Vogel's Approximation Method is used for finding the IFS of the given transportation problem :-

unit cost Penalty Method or Vogel's Approximation Method (VAM)

Illustrative example (VAM)

calculate the associated cost by using VAM.

	W1	W2	W3	Supply
F1	4	14	8	5
F2	6	6	1	8
F3	10	16	14	7
F4	2	12	4	14
Demand	7	9	18	34

* under this first of all identify the balanced or unbalanced Transportation problem.
* Above Transportation problem is balanced i.e. 34 (Supply = Demand)

Table 1

Warehouses / Factories	W_1	W_2	W_3	Supply	Penalty P_1
	4	14	8		4
F_1				5	
F_2	6	8	6	10	5
F_3	10	16	14	7	4
F_4	2	12	4	14	2
Demand	7	21	18	34	
Penalty P_1	2	6 ↑	3		

VAM consists of the following steps:

Step 1. From the transportation cost table we determine the penalty for each row and column.

- These penalties are calculated for each row (column) by subtracting the least cost element in that row (column) from the second lowest cost element in the same row (column).

Step 2. After this we identify the row or column with the largest penalty among all the rows and columns.

Step 3. In the largest penalty row (column) identify the least cost cell, if it happens to be in row and column then we allocate maximum possible number of units keeping the row and column constraints in mind.

Step 4. Remove the row or column from further consideration for making allocation for which supply (or demand) is exhausted in making allocations at a stage.

Table 2

Warehouses / Factories	W_1	W_2	W_3	Supply	Penalty P_2
F_1	4	14	8	5	4
F_3	10	16	14	7	4
F_4	2	12	(14) 4	~~14~~ 0	2
Demand	7	1	~~18~~ 4	34	
Penalty P_2	2	2	4↑		

Step 5. Again compute row and column penalties for the reduced transportation table, go to step (ii). Repeat the procedure until all the requirements are satisfied.

Table-3

warehouses / factories	W_1	W_2	W_3	Supply	Penalty P_3
f_1	⑤ 4	14	18	~~5~~ 0	4
f_3	10	16	14	7	4
Demand	~~7~~ 2	1	4	12	
Penalty P_3	6 ↑	2	6		

Table - 4

warehouses / factories	W_1	W_2	W_3	Supply
f_3	② 10	① 16	④ 14	~~7~~ ~~3~~ 1 0
Demand	~~2~~ 0	~~1~~ 0	~~4~~ 0	7

Table - 5

Warehouses / Factories	W_1	W_2	W_3	Supply
f_1	4 (5)	14	8	5
f_2	6	6 (8)	1	8
f_3	10 (2)	16 (1)	14 (4)	7
f_4	2	12	4 (14)	14
Demand	7	9	18	34

Total cost = $5 \times 4 = 20$

$8 \times 6 = 48$

$2 \times 10 = 20$

$1 \times 16 = 16$

$4 \times 14 = 56$

$14 \times 4 = 56$

₹216 Ans.