

1D The Stepping-Stone Method

The stepping-stone method (the two rules for the cycle of adjustments):

The value of θ :

The exiting cell:

If two cells are reduced to 0:

Checking the new cost:

1. In Example 2 (1A question 2) the table of costs and the initial solution were as shown, at a cost of £9010. Obtain an improved solution and find the improved cost.

	W	X	Y	Z	Stock
A	180	110	130	290	14
B	190	250	150	280	16
C	240	270	190	120	20
Demand	11	15	14	10	50

	W	X	Y	Z	Stock
A	11	3			14
B		12	4		16
C			10	10	20
Demand	11	15	14	10	50

Stepping-stone route

	W	X	Y	Z	Stock
A	11	3			14
B		12	4		16
C			10	10	20
Demand	11	15	14	10	50

Improved solution

	W	X	Y	Z	Stock
A					14
B					16
C					20
Demand	11	15	14	10	50

To find an optimal solution:

- Find an optimal solution for question 1.

Second iteration: shadow costs and improvement indices

	W	X	Y	Z	S(·)
A					
B					
C					
D(·)					

	W	X	Y	Z	S(·)
A					
B					
C					
D(·)					

Stepping-stone route and improved solution

	W	X	Y	Z	Stock
A		14			14
B	11	1	4		16
C			10	10	20
Demand	11	15	14	10	50

	W	X	Y	Z	Stock
A					14
B					16
C					20
Demand	11	15	14	10	50

Third iteration: shadow costs and improvement indices

	W	X	Y	Z	S(·)
A					
B					
C					
D(·)					

	W	X	Y	Z	S(·)
A					
B					
C					
D(·)					

3. The table shows the unit cost, in pounds, of transporting goods from each of three warehouses A, B and C to each of three supermarkets X, Y and Z. It also shows the stock at each warehouse and the demand at each supermarket. Solve the transportation problem shown in the table. Use the north-west corner method to obtain an initial solution. You must state your shadow costs, improvement indices, stepping-stone routes, θ values, entering cells and exiting cells. You must state the initial cost and the improved cost after each iteration.

	X	Y	Z	Stock
A	24	22	28	13
B	26	26	14	11
C	20	22	20	12
Demand	10	13	13	36

Initial solution

	X	Y	Z	Stock
A				13
B				11
C				12
Demand	10	13	13	36

First iteration

	X	Y	Z	S(·)
A				
B				
C				
D(·)				

	X	Y	Z	S(·)
A				
B				
C				
D(·)				

	X	Y	Z	Stock
A				13
B				11
C				12
Demand	10	13	13	36

	X	Y	Z	Stock
A				13
B				11
C				12
Demand	10	13	13	36

Second iteration

	X	Y	Z	S(·)
A				
B				
C				
D(·)				

	X	Y	Z	S(·)
A				
B				
C				
D(·)				

	X	Y	Z	Stock
A				13
B				11
C				12
Demand	10	13	13	36

	X	Y	Z	Stock
A				13
B				11
C				12
Demand	10	13	13	36

Third iteration

	X	Y	Z	S(·)
A				
B				
C				
D(·)				

	X	Y	Z	S(·)
A				
B				
C				
D(·)				

