Damietta University
Faculty of Commerce
English Program

Production and Operations Management

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Location Strategies

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Location Strategies
Transportation Models

Outline

► Transportation Modeling

► Developing an Initial Solution

► The Stepping-Stone Method

► Special Issues in Modeling

Stepping-Stone Method

1. Select any unused square to evaluate

2. Beginning at this square, trace a closed path back to the original square via squares that are currently being used

   (*Just move horizontally and vertically*)

3. Beginning with a plus (+) sign at the unused corner, place alternate minus and plus signs at each corner of the path just traced

Stepping-Stone Method

4. Calculate an improvement index by first adding the unit-cost figures found in each square containing a plus sign and subtracting the unit costs in each square containing a minus sign

5. Repeat steps 1 though 4 until you have calculated an improvement index for all unused squares. If all indices are ≥ 0, you have reached an optimal solution.

Stepping-Stone Method

From \ To	(A) Albuquerque	(B) Boston	(C) Cleveland	Factory capacity
(D) Des Moines	100 $5	$4	$3	100
(E) Evansville	200 $8	100 $4	$3	300
(F) Fort Lauderdale	$9	100 $7	200 $5	300
Warehouse requirement	300	200	200	700

The impact on the cost
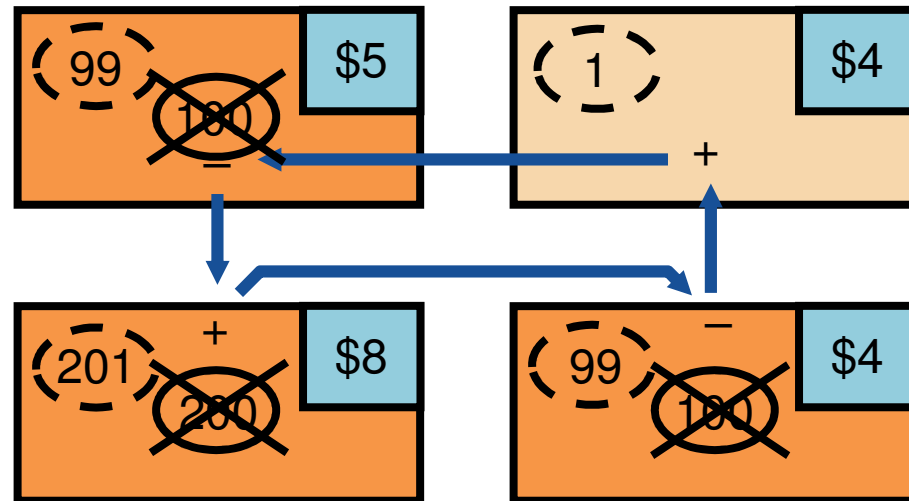
Des Moines-Boston index

$= \$4 - \$5 + \$8 - \$4$

$= \quad +\$3$

Figure C.5

Stepping-Stone Method

From \ To	(A) Albuquerque	(B) Boston	(C) Cleveland	Factory capacity
(D) Des Moines	100 $5 −	$4	Start + $3	100
(E) Evansville	200 $8 +	100 $4 −	$3	300
(F) Fort Lauderdale	$9	100 $7 +	200 $5 −	300
Warehouse requirement	300	200	200	700

Des Moines-Cleveland index
$$= \$3 - \$5 + \$8 - \$4 + \$7 - \$5 = +\$4$$

Figure C.6

Stepping-Stone Method

To — From	(A) Albuquerque	(B) Boston	(C) Cleveland	Factory capacity
(D) Des Moines	100 $5	$4	$3	100
(E) Evansville				
(F) Fort Laude				
Warehouse requirement				

Evansville-Cleveland index

$$= \$3 - \$4 + \$7 - \$5 = +\$1$$

(Closed path = EC – EB + FB – FC)

Fort Lauderdale-Albuquerque index

$$= \$9 - \$7 + \$4 - \$8 = -\$2$$

(Closed path = FA – FB + EB – EA)

Stepping-Stone Method

1. If an improvement is possible, choose the route (unused square) with the largest negative improvement index

   (Here it's only one negative index, *FA*)

2. On the closed path for that route, select the smallest number found in the squares containing minus signs

3. Add this number to all squares on the closed path with plus signs and subtract it from all squares with a minus sign

Stepping-Stone Method

From \ To	(A) Albuquerque	(B) Boston	(C) Cleveland	Factory capacity
(D) Des Moines	100 $5	$4	$3	100
(E) Evansville	200 $8	100 $4	$3	300
(F) Fort Lauderdale	$9	100 $7	200 $5	300
Warehouse requirement				

1. Add 100 units on route FA
2. Subtract 100 from route FB
3. Add 100 to route EB
4. Subtract 100 from route EA

Figure C.7

Stepping-Stone Method

From \ To	(A) Albuquerque	(B) Boston	(C) Cleveland	Factory capacity
(D) Des Moines	100 $5	$4	$3	100
(E) Evansville	100 $8	200 $4	$3	300
(F) Fort Lauderdale	100 $9	$7	200 $5	300
Warehouse requirement	300	200	200	700

Total Cost = $5(100) + $8(100) + $4(200) + $9(100) + $5(200)
= $4,000

Figure C.8

Thank you