



IE453 Facilities Planning

Ch 6-Section 6.4

CRAFT-BASED IMPROVEMENT METHOD

6.24 Consider four departments labeled A, B, C, and D. Each department is represented by a 1×1 square. The following data are given:

		Flow-Between Matrix				Unit Cost Matrix				
		A	B	C	D	A	B	C	D	
Initial Layout	A	—	6	0	3	A	—	2	0	3
	B		—	5	0	B	2	—	1	0
	C			—	0	C	0	1	—	0
	D				—	D	3	0	0	—

The location of department A is *fixed*. Answer the following questions using CRAFT with *two-way* exchanges only.

- a. List all the department pairs that CRAFT would consider exchanging. (Do *not* compute their associated cost.)
 - b. Compute the *actual* cost of exchanging departments C and D.
 - c. Given that department A is fixed and that each department must remain as a 1×1 square, is the layout obtained by exchanging departments C and D optimum? Why or why not? (Hint: Examine the properties of the resulting layout and consider the objective function of CRAFT.)
- 6.26 When CRAFT evaluates the exchange of departments, instead of actually exchanging the departments, it only exchanges the centroids of departments.
- a. What is the impact of this method of exchanging if all departments are the same size?
 - b. Given the following from-to chart and scaled layout (each square is 1×1), what does the evaluation of the exchange of departments B and C indicate should be saved over the existing layout, and what is actually saved once this exchange is made?

To		A	B	C
From	A	—	10	6
B	2	—	7	
C				—

From-To Chart

A	A	A	C	B	B	B	B
A	A	A	C	B	B	B	B
A	A	A	C	B	B	B	B

Initial Layout



6.27 Explain the steps CRAFT would take with the following problem and determine the final layout. Only two-way exchanges are to be considered.

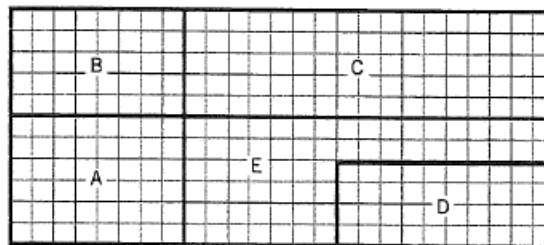
To From	A	B	C	D	E
A	—	3	2	1	
B		—	1	3	
C	1		—	4	
D				—	
E					—

From-To Chart

A	A	A	B	B	B
A	A	A	C	C	C
A	A	A	C	C	C
D	D	D	E	E	E
D	D	D	E	E	E

Initial Layout

6.28 A manufacturing concern has five departments (labeled A through E) located in a rectangular building as shown below:



Suppose the flow data, the unit cost data, and the distance matrix are given as follows:

Flow-Between Matrix						Unit Cost (\$/Unit Dist.)						Distance Matrix					
	A	B	C	D	E		A	B	C	D	E		A	B	C	D	E
A	—	0	5	0	5	A	—	0	1	0	1	A	—	6	20	18	11
B		—	6	2	0	B		—	1	4	0	B		—	12	22	15
C			—	3	0	C			—	3	0	C			—	10	8
D				—	7	D				—	1	D				—	7
E					—	E					—	E					—

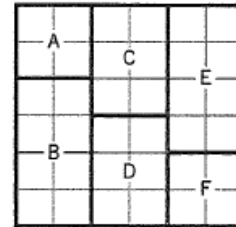
- Using the CRAFT two-way exchange procedure, indicate all the department pairs CRAFT would consider exchanging in the above layout.
- Compute the *estimated* cost of exchanging departments A and E.



6.29 Suppose the following layout is provided as the initial layout to CRAFT. The flow-between matrix and the distance matrix are given as follows. (All the c_{ij} values are equal to 1.0.)

Flow-Between Matrix						
	A	B	C	D	E	F
A	—	0	8	0	4	0
B		—	0	5	0	2
C			—	0	1	0
D				—	6	0
E					—	4
F						—

Distance Matrix						
	A	B	C	D	E	F
A	—	30	25	55	50	80
B		—	45	25	60	50
C			—	30	25	55
D				—	45	25
E					—	30
F						—



- Given the above data and initial layout, which department pairs will *not* be considered for exchange.
- Compute the cost of the initial layout.
- Compute the *estimated* layout cost assuming that departments E and F are exchanged.