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

Learning Objectives

When you complete this part of current chapter you should be able to:

1. ***Develop*** an initial solution to transportation models with the northwest-corner method
2. ***Develop*** an initial solution to transportation models with the intuitive lowest-cost method
3. ***Solve*** a problem with the stepping-stone method

Transportation Modeling

- An interactive procedure that finds the *least costly* means of moving products from a series of sources to a series of destinations
- Can be used to help resolve distribution and location decisions

The main objective is:
Cost Minimization
(Currency units,
Hours, Distances)

How do Transportation Modeling

- Transportation model is a special class of linear programming
- As such you need to know:
  1. The *origin points* and the capacity or supply per period at each
  2. The *destination points* and the required or demand per period at each
  3. The *cost of shipping* one unit from each origin to each destination

Transportation Problem

Relevant data of Arizona Plumbing are presented in the following table and chart:

TABLE C.1 Transportation Costs per Bathtub for Arizona Plumbing

FROM \ TO	ALBUQUERQUE	BOSTON	CLEVELAND
Des Moines	$5	$4	$3
Evansville	$8	$4	$3
Fort Lauderdale	$9	$7	$5

Transportation Problem

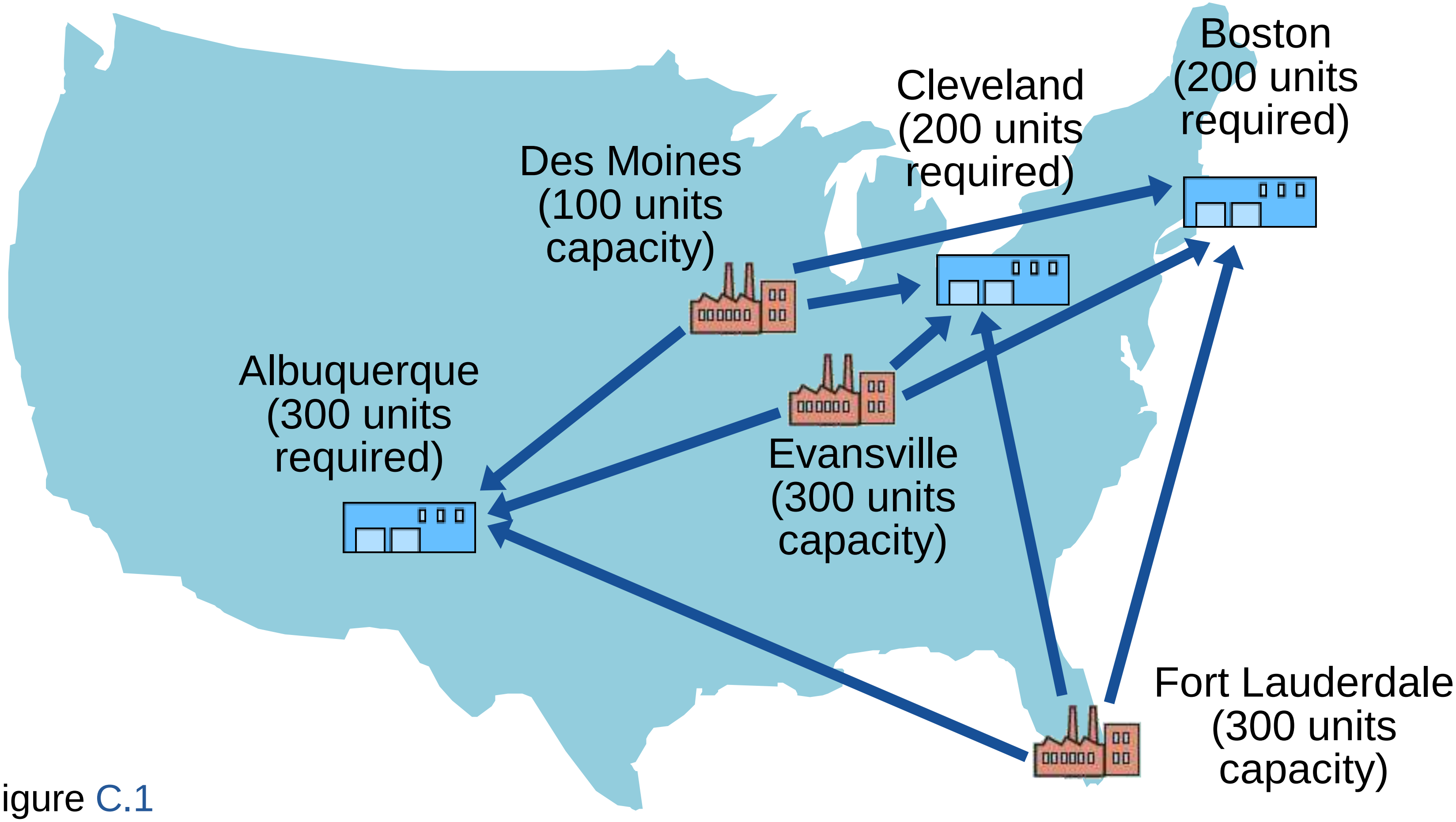

Figure C.1

Cautions: Be sure that:

- Objective function must be linear (cost of transportation is a constant regardless of the distance).
- Units are interchangeable (units are similar).
- Sum of capacity units must equal to required units (if not you have to add a dummy variable to make a balance).

Transportation Matrix

Figure C.2

From \ To	Albuquerque	Boston	Cleveland	Factory capacity
Des Moines	$5	$4	$3	100
Evansville	$8	$4	$3	300
Fort Lauderdale	$9	$7	$5	300
Warehouse requirement	300	200	200	700

Des Moines capacity constraint

Cell representing a possible source-to-destination shipping assignment (Evansville to Cleveland)

Cost of shipping 1 unit from Fort Lauderdale factory to Boston warehouse

Cleveland warehouse demand

Total demand and total supply

Northwest-Corner Rule

- Start in the upper left-hand cell (or northwest corner) of the table and allocate units to shipping routes as follows:
  1. Exhaust the supply (factory capacity) of each row before moving down to the next row
  2. Exhaust the (warehouse) requirements of each column before moving to the next column
  3. Check to ensure that all supplies and demands are met

Northwest-Corner Rule

- Assign 100 tubs from Des Moines to Albuquerque (exhausting Des Moines's supply)
- Assign 200 tubs from Evansville to Albuquerque (exhausting Albuquerque's demand)
- Assign 100 tubs from Evansville to Boston (exhausting Evansville's supply)
- Assign 100 tubs from Fort Lauderdale to Boston (exhausting Boston's demand)
- Assign 200 tubs from Fort Lauderdale to Cleveland (exhausting Cleveland's demand and Fort Lauderdale's supply)

Northwest-Corner Rule

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

Means that the firm is shipping 100 bathtubs from Fort Lauderdale to Boston

Figure C.3

Northwest-Corner Rule

TABLE C.2	Computed Shipping Cost			
ROUTE				
FROM	TO	TUBS SHIPPED	COST PER UNIT	TOTAL COST
D	A	100	$5	$ 500
E	A	200	8	1,600
E	B	100	4	400
F	B	100	7	700
F	C	200	5	$1,000
				$4,200

This is a feasible solution but not necessarily the lowest cost alternative


Thank you