


Transportation Models


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Learning Objectives

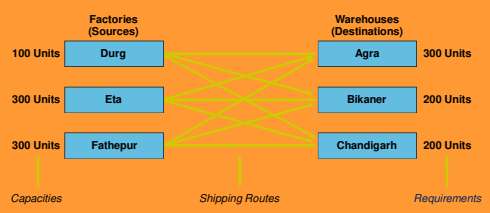
After completing this topic, you will be able to:

1. Structure special LP problems using the transportation models
2. Use the northwest corner, VAM, and MODI
3. Solve facility location and other application problems with transportation models



Introduction

- Example of a transportation problem in a network format



The diagram illustrates a transportation network. On the left, under 'Factories (Sources)', are Durg (100 Units), Eta (300 Units), and Fathepur (300 Units). On the right, under 'Warehouses (Destinations)', are Agra (300 Units), Bikaner (200 Units), and Chandigarh (200 Units). Green lines represent shipping routes connecting every factory to every warehouse. Labels 'Capacities', 'Shipping Routes', and 'Requirements' are placed at the bottom of the diagram.

Setting Up a Transportation Problem



- The Executive Ordnance Corporation manufactures Bullets at three locations: Dha, Eshwari, and Fort Williams
- The firm distributes the desks through regional warehouses located in Agartala, Baroni, Chandipur
- Estimates of the monthly production capacity of each factory and the bullets needed at each warehouse are shown in Figure.

Setting Up a Transportation Problem



- Production costs are the same at the three factories so the only relevant costs are shipping from each *source* to each *destination*
- Costs are constant no matter the quantity shipped
- The transportation problem can be described as *how to select the shipping routes to be used and the number of desks to be shipped on each route so as to minimize total transportation cost*
- Restrictions regarding factory capacities and warehouse requirements must be observed

Setting Up a Transportation Problem



- The first step is setting up the transportation table
- Its purpose is to summarize all the relevant data and keep track of algorithm computations

Transportation costs per desk for Executive Ordnance

FROM \ TO	Agra	Bikaner	Chandigarh
Durg	₹5	₹4	₹3
Eta	₹8	₹4	₹3
Fathepur	₹9	₹7	₹5

Setting Up a Transportation Problem

- Transportation table the Company

FROM \ TO	Agra	Bikaner	Chandigarh	FACTORY CAPACITY
Durg	₹5	₹4	₹3	100
Eta	₹6	₹4	₹3	300
Fathepur	₹9	₹7	₹5	300
WAREHOUSE REQUIREMENTS	300	200	200	700

Durg capacity constraint
 Cost of shipping 1 unit from F factory to B warehouse
 C warehouse demand
 Total supply and demand
 Cell representing a source-to-destination to C) shipping assignment that could be made (E)

Setting Up a Transportation Problem

- In this table, total factory supply exactly equals total warehouse demand
- When equal demand and supply occur, a *balanced problem* is said to exist
- This is uncommon in the real world and we have techniques to deal with unbalanced problems

Developing an Initial Solution: Northwest Corner Rule

- Once we have arranged the data in a table, we must establish an initial feasible solution
- One systematic approach is known as the *northwest corner rule*
- Start in the upper left-hand cell 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 demand (warehouse) requirements of each column before moving to the right to the next column
 3. Check that all supply and demand requirements are met.
- In this problem it takes five steps to make the initial shipping assignments
