Transportation

Logistics Management

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Basics

- Transportation costs can be as much as 20% of total production costs

- Logistics management is the process of managing and controlling the transportation and distribution of items
- Logistics implies the movement of materials, parts, and finished goods from suppliers, between distribution sites, and to customers
  - Objective is to deliver correct amount of goods to the specified location on time at the lowest possible cost
  - Major activities are facility location, transportation, inventory and handling, and storage.

Transport and Distribution systems

- Five principal systems of transportation
  - Railroads – transport low-value, high density, bulk products for long distance haulage. Less flexible
  - Highways – flexible point-to-point service of small loads of good quality item within small to medium distances
  - Water – cheapest, high volume transportation with the least speed
  - Air – specific, light weight items for rapid delivery
  - Pipelines – liquid transport, high initial investment but low operating cost

Transportation Method

- Important decision in logistics management is determining the lowest cost means of transport from among several alternatives

- A quantitative technique for determining the least cost means of transporting goods or services is the transportation method

- Transportation model formulation comprises of:
  - A product is transported from a number of sources to a number of destinations at minimum possible cost
  - Each source is able to supply a fixed number of units of product and each destination has a fixed demand for the product

Important Considerations

- Determination of transportation plan of a single commodity from number of sources to number of destination

- Data of the model include:
  - Level of supply at each source and amount of demand at each destination
  - Unit transportation cost of the commodity from each source to each destination

- Since there is only one commodity a destination can receive its demand from one or more sources
  - Objective is to determine the amount to be shipped from each source to each destination such that the total transportation cost is minimized

Grain is harvested in the Midwest and stored in grain elevators in three cities, viz., Kansas City, Omaha, and Des Moines. These grain elevators supply three mills, operated by the Heartland Bread and Cereal company located in Chicago, St. Louis, and Cincinnati. Grain is shipped to the mills in railroad cars. Each grain elevator is able to supply the following number of tons of grain to the mills on a monthly basis.

Table 1: Suppliers

Grain Elevators	Supply
Kansas City	150
Omaha	175
Des Moines	275

Each mill demands the following number of tons of grains per month.

Table 2: Demand

Mills	Demand
Chicago	200
St. Louis	100
Cincinnati	300

The cost of transportation of one ton of grain from each grain elevator to each mill differs according to the distance and rail system. These costs are summarized below.

Table 3: Transportation Costs (in $)

Grain	Mill		
Elevator	Chicago	St. Louis	Cincinnati
Kansas City	6	8	10
Omaha	7	11	11
Des Moines	4	5	12

The problem is to determine how many tons of wheat to transport from each grain elevator to each mill on a monthly basis in order to minimize the total cost of transportation. Solve the problem.