**Transportation & Distribution Case**

Amazon, with its extensive inventory of thousands of items, employs a dynamic strategy for order fulfillment. When a customer places an order, such as 20 items, a portion of those items may be distributed across various warehouses like 10 in the New York City warehouse, 5 in the LA warehouse, and so forth. The customer isn't aware of the specific warehouse locations for their items. Amazon utilizes an ongoing optimization technique immediately upon order placement to determine the most cost-effective warehouse for shipping, ensuring that the items are delivered at the lowest possible cost.

The transportation and distribution problem describes an opportunity to minimize transportation costs. There are four distribution centers of Amazon with inventory to be shipped to four destinations. The **goal** is to minimize transportation **costs** but satisfy all demand for the products at all locations.

The initial spreadsheet looks like the picture below:  
  
A screenshot of a computer

Description automatically generated

Shipping from LA to the East coast is priced at $5 per item, $3.50 for the Midwest, $4.20 for the South, and $2.20 for the West. The higher cost to the East is attributed to the considerable distance across the country. Conversely, the lower shipping cost on the West coast is due to the proximity of Los Angeles to that region.

The Total Cost we are going to get it by multiplying the two table values.  
i.e. ( using =SUMPRODUCT(B4:E7,B11:E14) )

The "Sent" column specifies the precise quantity dispatched from the inventory of each city to various regions. Conversely, the "Received" row outlines the quantity received from different cities within each region.

In this case we have a constraint that the shipments should be less than or equal to the inventory, but we want everybody to be happy, how much they receive is at least what they ask for.   
  
So, to get the result for this type of case we are going to run Solver in Excel.   
Keeping the goal in solver by minimizing the cost. And what exactly we are going to change is the highlighted portion.

A yellow and black chart

Description automatically generated

For constraints:

1. Sent will be less than or equal to capacity.
2. Received will be greater than or equal to demand.

The after running the solver we get results as,

A screenshot of a computer

Description automatically generated

The total cost for all these shipments amounts to **$65,800**, indicating a strategic shipping approach. It can be inferred that Fargo opts for the most economical route by consistently shipping products to the West, similar to LA. New York City, on the other hand, consistently chooses the East due to its cost-effectiveness, a strategy also employed by Atlanta. This operational strategy mirrors the practices of companies like Amazon, which routinely optimize shipping costs for each order they receive.