

MSBA 204 Operations Analytics (Decision Analytics)
Summer 2024

Problem Description:

Let's manage a network of six different electronics retailers, each with specific requirements for various types of tech gadgets. The retailers' needs can be met either from a group of four distribution centers or directly from one of two manufacturing plants. Each distribution center has a maximum capacity for handling gadget volume, and each manufacturing plant has a maximum production output. We also have clear costs associated with transporting the gadgets, whether it's from a manufacturing plant to a distribution center, from a distribution center to a retailer, or directly from a manufacturing plant to a retailer.

Our supply chain comprises two manufacturing plants located in TechHub and Gadgetville, responsible for producing the tech gadgets. Let's outline their respective maximum production capacities:

Factory	Supply (units)
TechHub	7,500
Gadgetville	9,500

The gadgets can be transported from a plant to a group of four distribution centers. Each distribution center has a maximum throughput capacity. It's important to note that distribution centers serve as intermediaries and do not produce or consume the gadgets themselves; they solely facilitate the transfer of gadgets to retailers.

Distribution Center	Throughput (units)
E-Tech Depot	4000
Gizmo Central	6000
Electro Hub	5500
Digital Warehouse	4500

Our network encompasses six electronics retailers, each with a specified demand for gadgets.

Retailer	Demand (units)
Tech Solutions	2500
Gadget World	1800
Electronics Emporium	3000
Digital Dreams	2700
Gizmo Galaxy	4000
Innovation Station	2200

Transportation costs are provided in the table below, denoted in dollars per unit. The columns represent source cities, and the rows represent destination cities. For instance, the cost of shipping gadgets from TechHub to Electro Hub is \$2 per unit. A '-' in the table signifies that the particular combination is not feasible. For example, it's not possible to ship from the Gadgetville plant to the E-Tech Depot distribution center.

From To	TechHub	Gadgetville	E-Tech Depot	Gizmo Central	Electro Hub	Digital Warehouse
Distribution Centers						
E-Tech Depot	2.0	-	-	-	-	-
Gizmo Central	1.5	1.0	-	-	-	-
Electro Hub	2.5	1.5	1.5	-	-	-
Digital Warehouse	2.0	2.0	2.0	2.0	-	-
Retailers						
Tech Solutions	2.5	-	1.5	1.0	-	-
Gadget World	-	-	2.0	1.5	2.0	-
Electronics Emporium	3.0	-	1.0	1.0	3.5	1.0
Digital Dreams	4.0	-	2.5	2.0	-	2.5
Gizmo Galaxy	-	-	-	1.0	1.0	1.0
Innovation Station	2.0	-	2.0	-	3.0	3.0

The question at hand is how to fulfill the demands of the electronics retailers while simultaneously minimizing shipping costs.