Optimization Tools and Your Supply Chain.

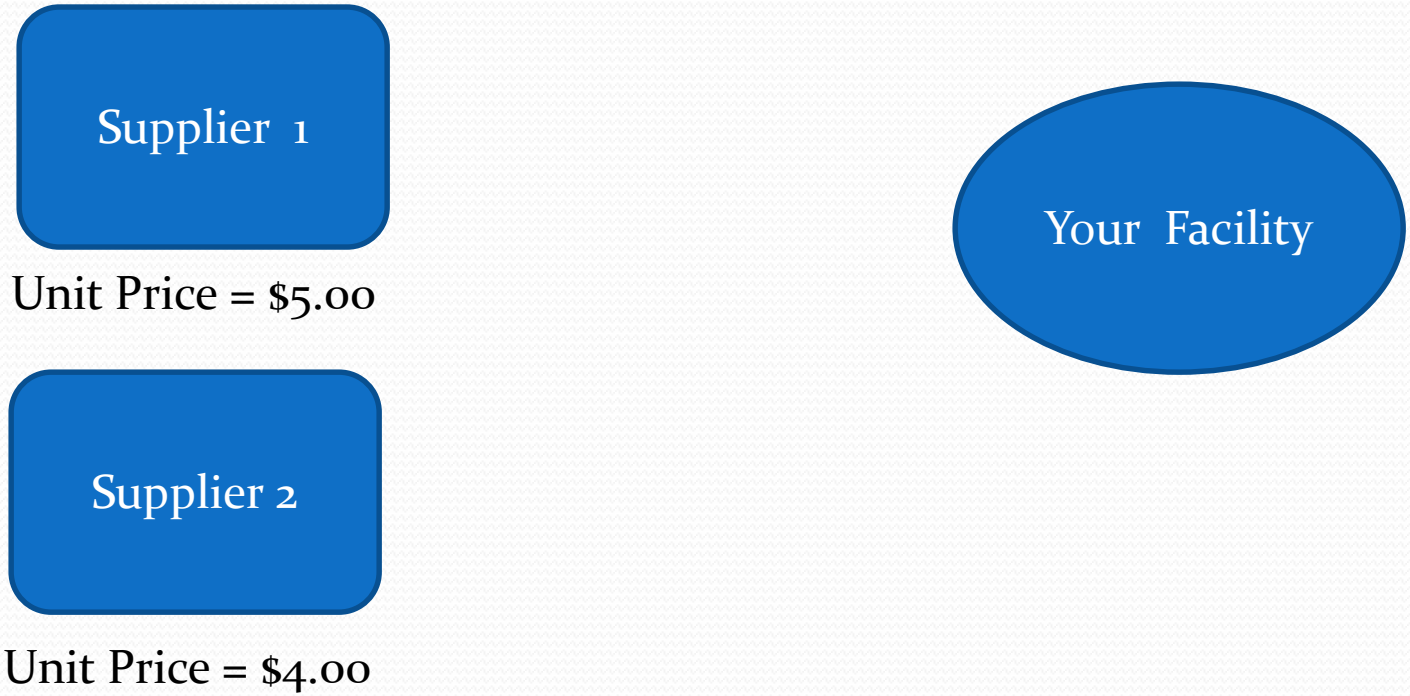
Optimization Tools and Your Supply Chain

- Agenda
  - Mathematical Modeling and Optimization Concepts
  - Summary of tool set
  - Best Practices.

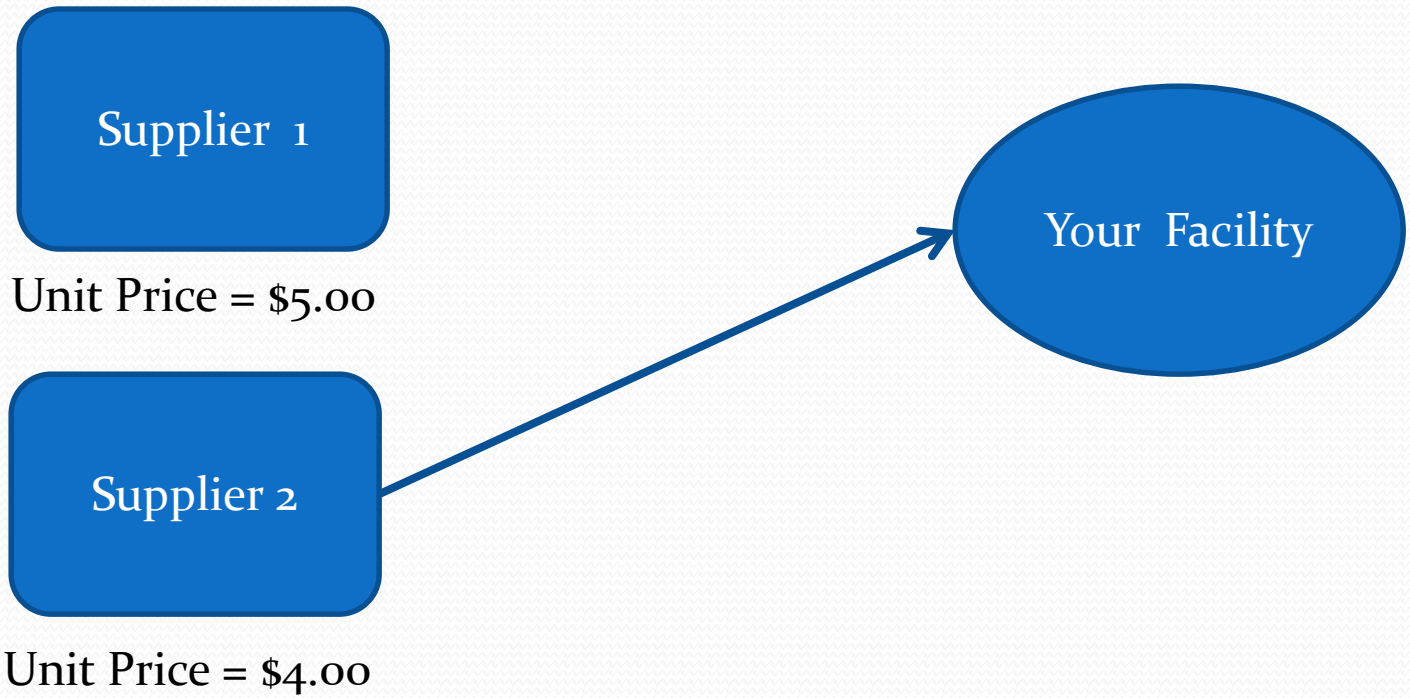
What is Supply chain optimization?

Supply chain optimization is the application of processes and tools to ensure the optimal operation of a manufacturing and distribution supply chain.[1] This includes the optimal placement of inventory within the supply chain, minimizing operating costs (including manufacturing costs, transportation costs, and distribution costs). This often involves the application of mathematical modelling techniques using computer software.

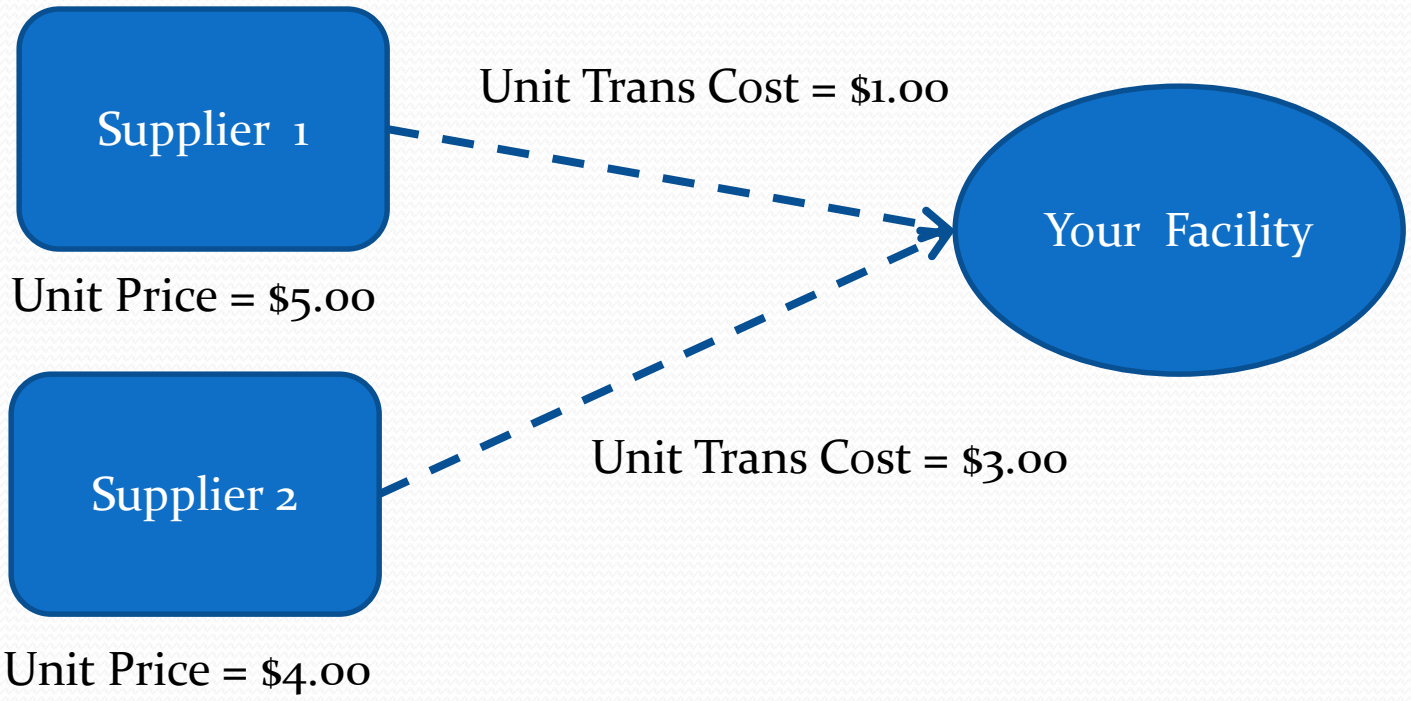
Mathematical Modeling



Mathematical Modeling



Mathematical Modeling



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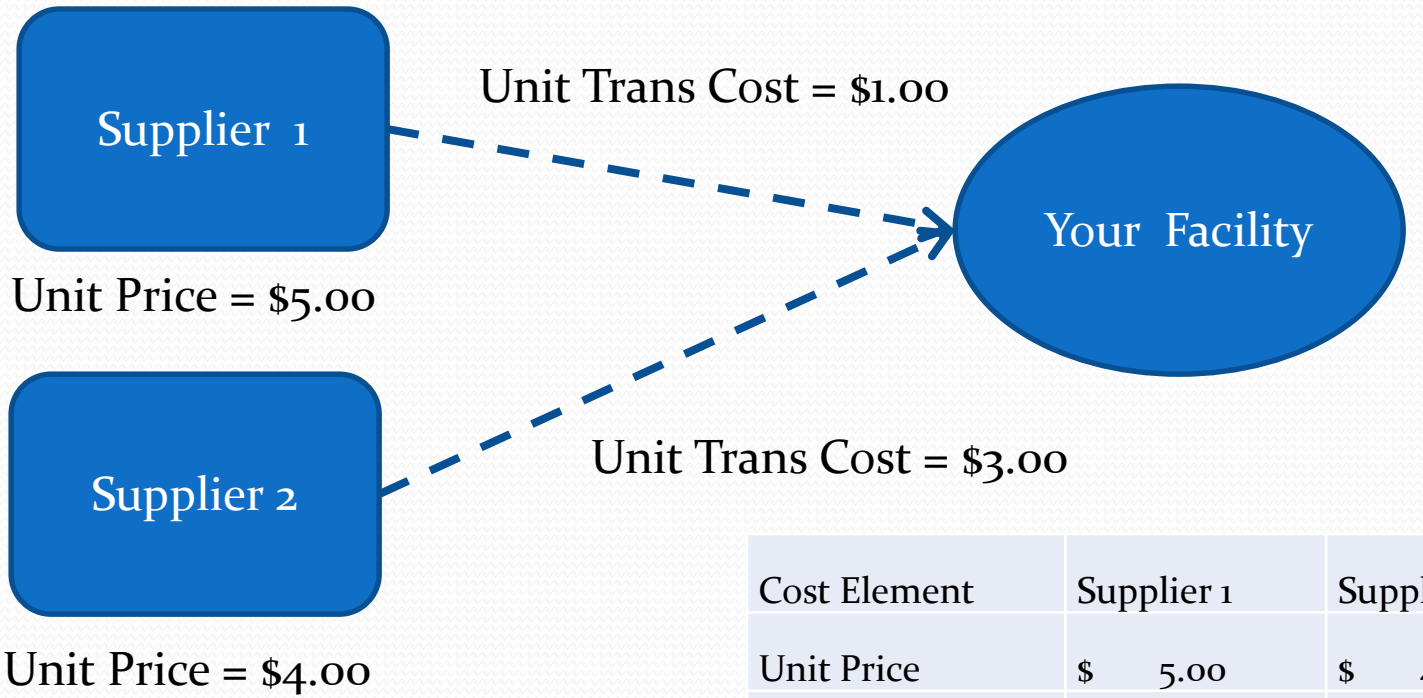
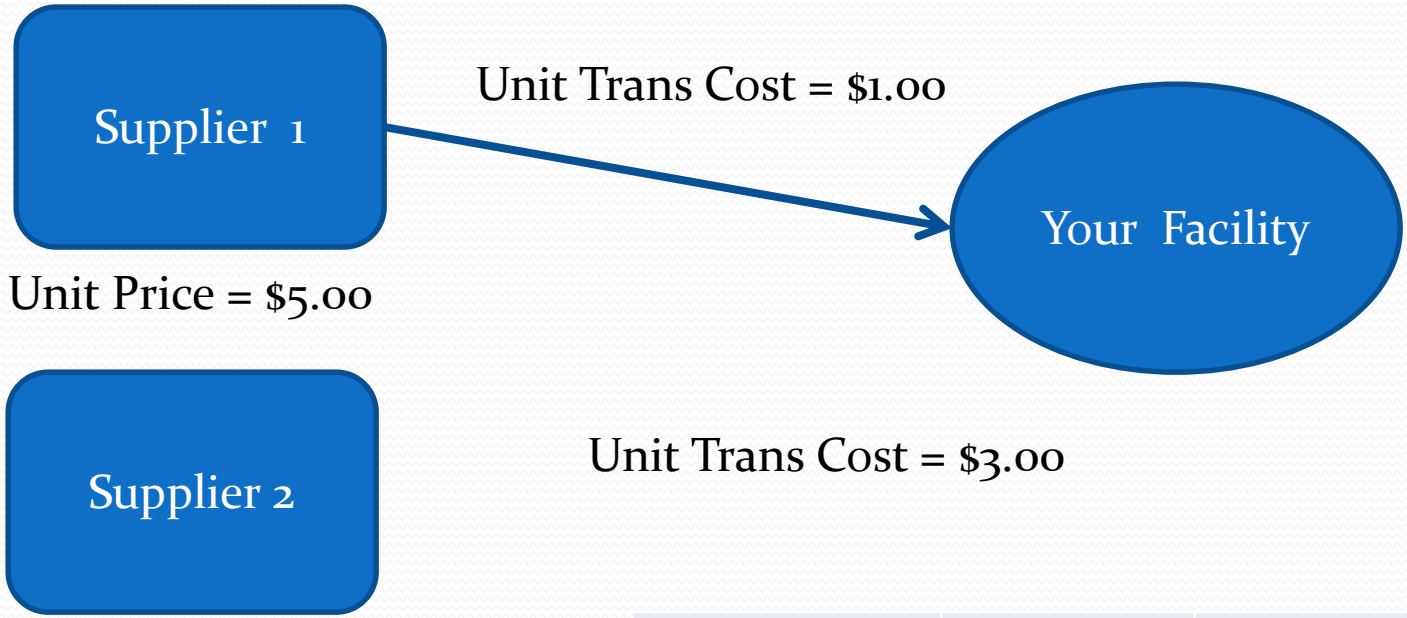


Cost Element	Supplier 1	Supplier 2
Unit Price	$ 5.00	$ 4.00
Unit Trans	$ 1.00	$ 3.00
Total Cost	$ 6.00	$ 7.00

Mathematical Modeling



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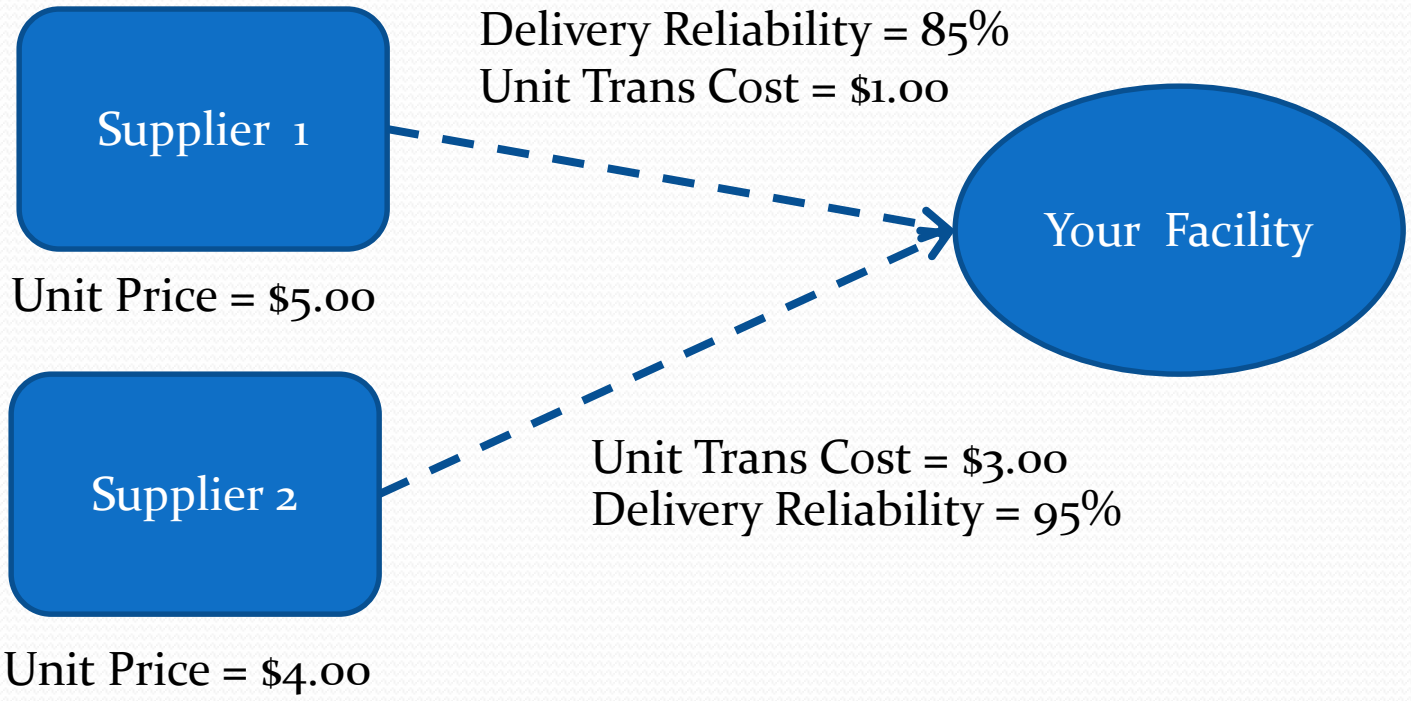
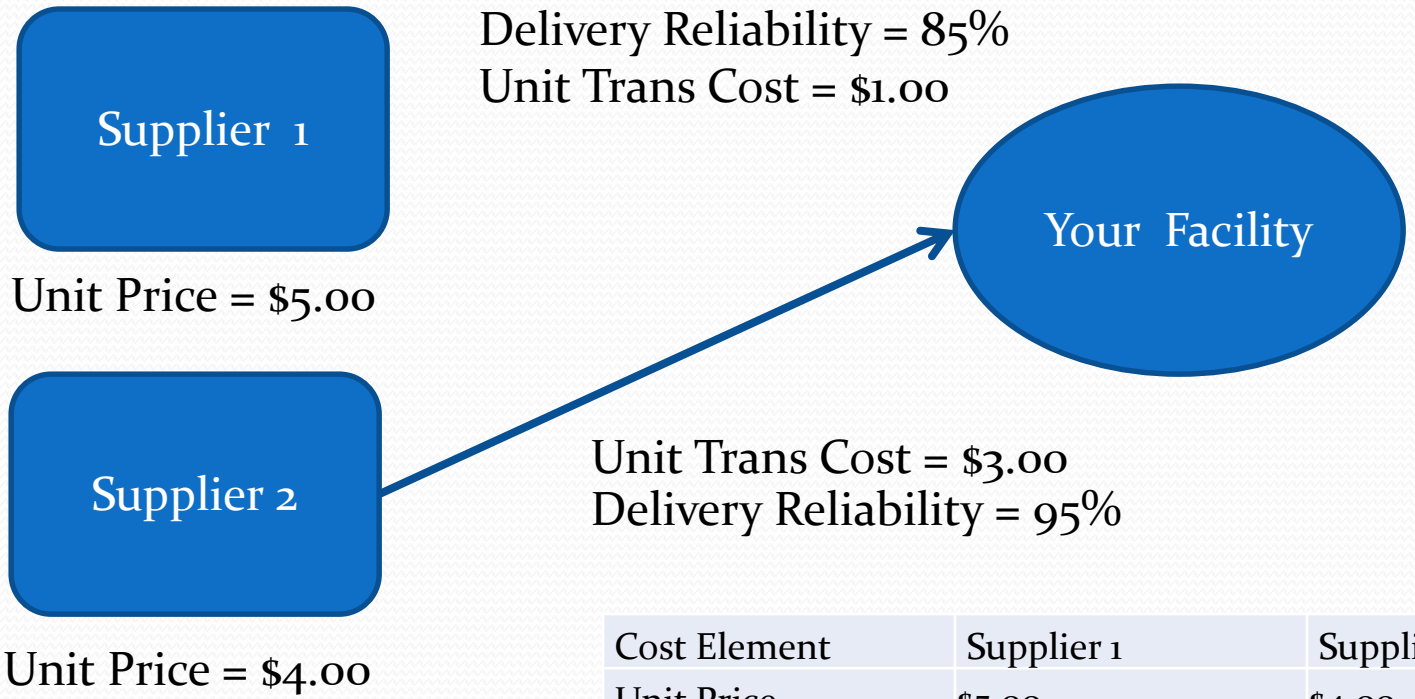
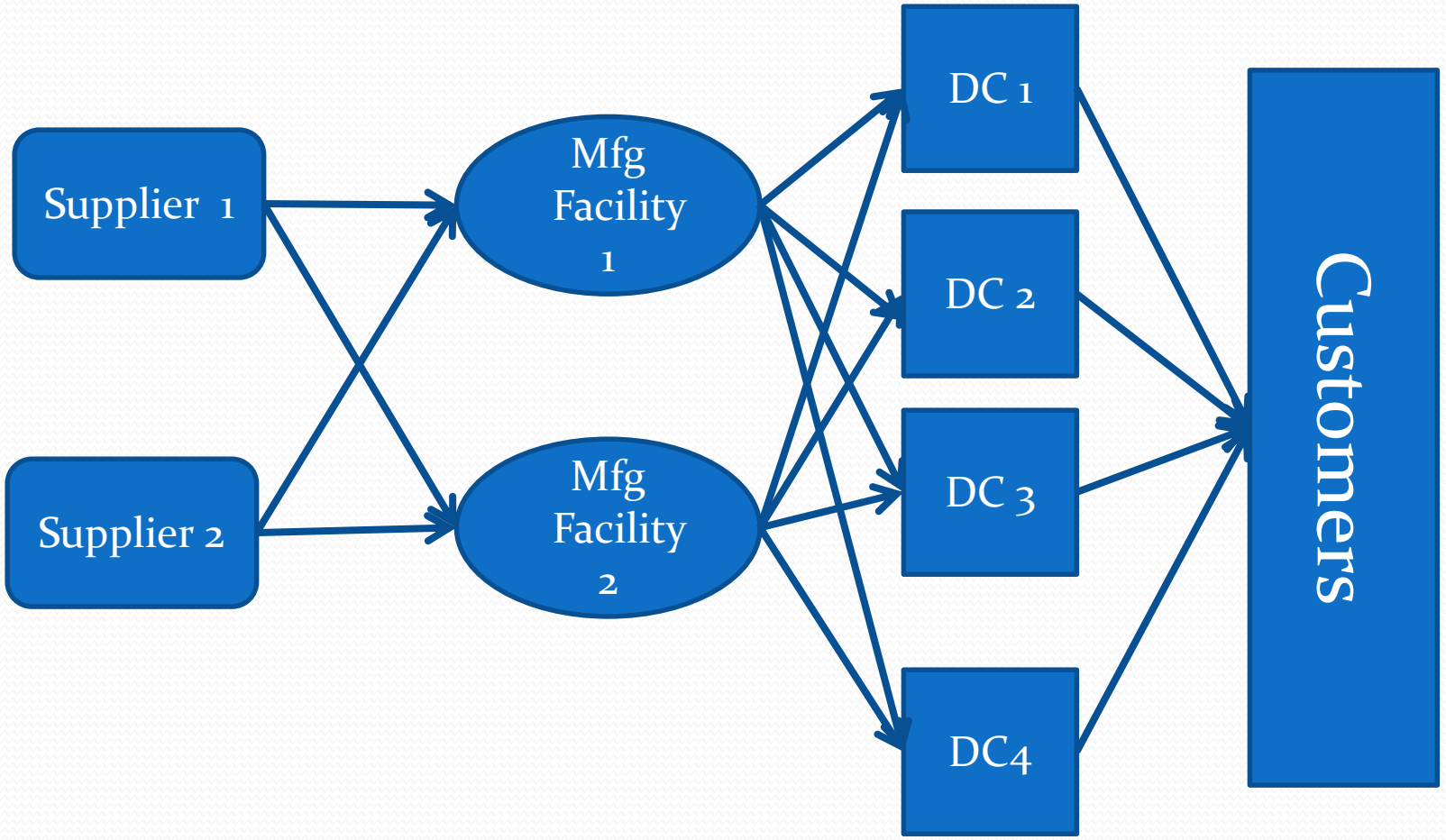


Mathematical Modeling



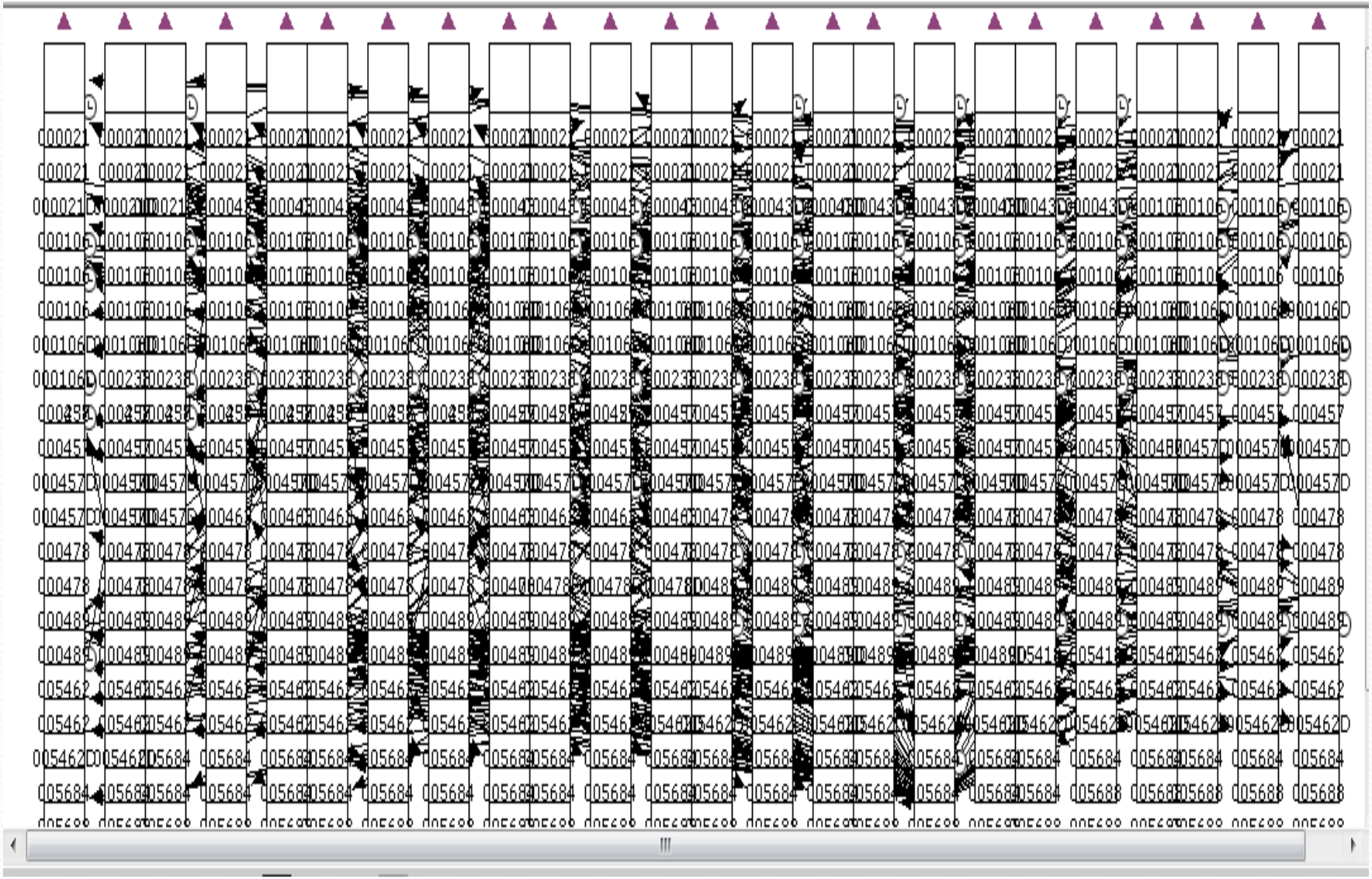
Cost Element	Supplier 1	Supplier 2
Unit Price	$5.00	$4.00
Unit Trans	$1.00	$3.00
Service Penalty	$10.00	$5.00
Total Cost	$16.00	$12.00

Mathematical Modeling



Price	**Manufacturing Cost**	**Storage Cap.**	**Location**
Reliability	**Capacity**	**Handling Cost**	**Service Lev**
Lead Time	**Reliablity**	**Handling Cap.**	**Lead Time**

Mathematical Modeling



Optimizing Models

- It's Magic!!
- Tools provide
  - Framework for modeling the problem
  - Solver engine
- True optimization involves some form of iterative calculation
  - A mixture of fixed and flexible variables
  - Best solution usually based on lowest cost
  - Often complex math is used to focus in on the set of flexible variables that give the best result.

There is no “Easy Button”



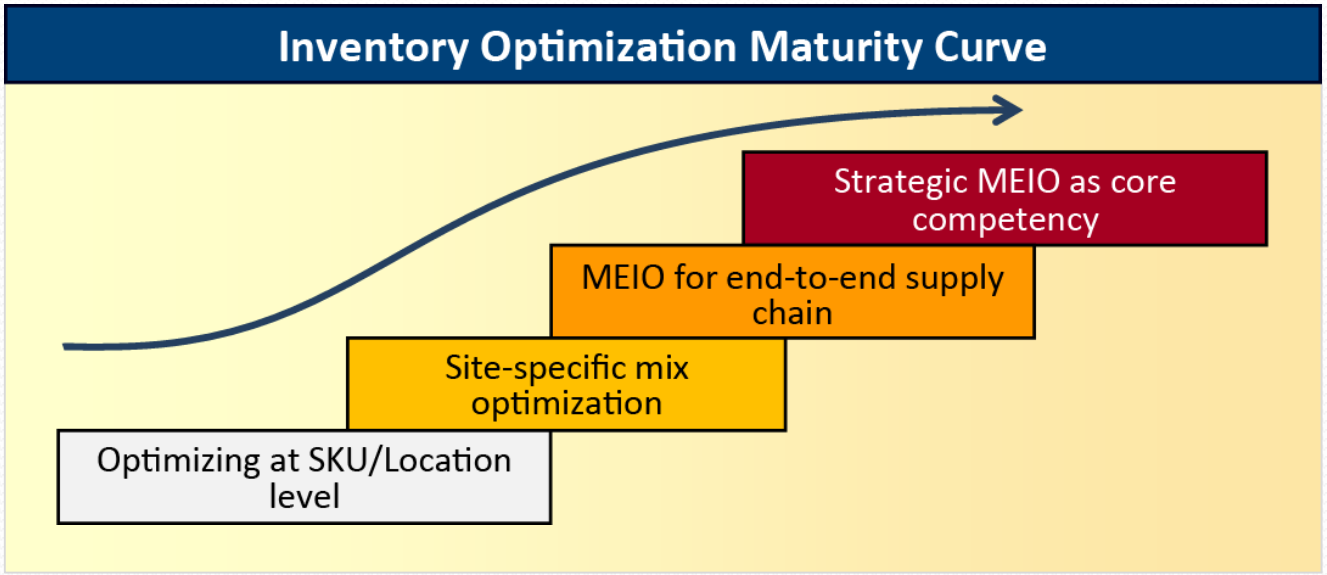
Types of Optimization Tools

	Strategic	Tactical	Executional
Business Case	• Site Selection & sizing • Supply Chain Design • Customer Sourcing • Supplier Selection	• Inventory Target • Production & Master Scheduling • Network Planning	• Truck Load Building • Transportation Routing • Dynamic fulfillment sourcing • Pricing
Frequency	As needed	Weekly/Monthly	Daily/Real Time
Data	Manual Integration	Flexible Integration	Tight Integration
Autonomy	Low/Hands On	Medium	High/No Touch
Primary Variables	Geography Building size Trans Cost Local Labor Cost	Production Cost Trans Cost Network capacity Demand Variability	Geography Trans Cost Inventory Availability Competitive Activity

Size of the Prize

- Payback will tend to be related to the following dimensions
  - Flexibility – Without options, there can be little or no optimization
  - Variety – If everything is the same or rarely changes, optimization results will tend to be front-loaded and plateau.
  - Volume - Higher volume tends to create variety as well as multiply savings
  - Quality of input data – Low quality input data will deliver solutions that cannot be consistently executed.
  - Baseline – The more inefficiencies in the existing supply chain and processes, the more benefit you will see.

Making The Journey



Planning Tools	Manual Spreadsheets	Integrated ERP/ASP
IO Tools	Manual Spreadsheets	Advanced Software Package
Data Required	Forecast/Shipment History	High Volume/Complex

Source – www.logility.com

Optimization Tools Lessons Learned

- Spend the time to clearly define your need and possible results
  - Understand where you are on “Maturity Curve”
  - Pick the right tool for what you want to optimize
  - Be aware of how the quality of your input data will affect outputs
  - Be prepared to defend/explain non-intuitive results
  - Have plans to clearly communicate less than outstanding results
  - Monitor process for refresh noise and/or sub-optimization

Optimization Tools Lessons Learned

- Pay for the test drive
  - Most of what you get from a standard sales presentation is worth what you pay for it.
    - Sales cycle will present “cherry-picked” results from other customers.
    - Demonstrations will typically use made up or canned data sets which won’t accurately represent your enterprise
    - Web Sites focus on “happy path”
  - Investing additional time and resources will improve your chances of success
    - Attend vendor conferences – This is a chance to talk to existing users and/or vendor consultants
    - Most vendors provide structured consulting processes to analyze your business, potential need and potential payback
    - Better option is to pay for regular consulting services to build a prototype model using your enterprise data.

Optimization Tools Lessons Learned

- Invest in human expertise
  - Tools can be complex
  - Creating and maintaining detailed models takes time
  - Dedicate resources to managing the IO process
    - Mathematical/statistical background
    - Knowledge of your business and supply chain
    - Communication skills
  - Investment of time and resources lead to ***better results, higher utility and greater value***

Optimization Tools and Your Supply Chain

- Questions ?????