



A ChemLogix White Paper

MEETING THE NETWORK OPTIMIZATION CHALLENGE

Balancing Service, Contribution and Asset Return for
the Global Business Unit

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To ensure the optimal operation of sourcing, manufacturing and distribution, chemical companies must constantly evaluate economic trade-offs vs. constraints. Through Supply Chain Network Optimization, chemical producers can streamline their supply chains to optimize service, contribution and asset return.

To provide some insight into the processes and benefits associated with Supply Chain Network Optimization, here are answers to some of the most frequently asked questions regarding this powerful optimization tool.

1. What is Supply Chain Network Optimization?

The optimized supply chain is one that operates with the best possible economics for a business unit performing against a set of constraints. The term “economic” has traditionally focused on cost. In many cases, costs included only the cost of logistics. However, best practices focus on the costs of selling, marketing, sourcing, production, distribution and working capital. In today’s dynamic business environment, economics are focused on contribution (revenue and costs) as well as return on assets.

Utilizing mathematical modeling called linear programming (LP), the economics of any variety of constraints (i.e. distance, time, etc.) can be defined. (For specialized “non-linear” problems, other tools can be utilized in combination with LP.) Constraints are defined according to three types of “flow” within the supply chain: (a) Physical Flow (transportation, staging and storage) of materials and products; (b) Information Flow associated with the service cycle; and (c) Cash Flow associated with operating income as well as current assets and liabilities. By analyzing the economics of these constraints, changes and improvements can be made to the supply chain.

2. What can be determined through Supply Chain Network Optimization?

By defining a Historical Baseline (at least one year of data of company operations) and current physical, service and/or cash constraints, network optimization can determine:

Service vs. Logistics Network Costs

- The best locations for inbound and outbound warehouses or terminals
- Optimal routing for raw materials, intermediates or products
- Stock levels within warehouses and terminals to meet service requirements

Service vs. Supply Chain Profit

In addition to logistics network costs:

- Lowest cost of raw material supply
- Best products or families to manufacture at specific plants
- Economics of different channels for product marketing and sales
- Economics of new business or the “best network” when business is lost
- Price break-even values for categories, product families, customers and products

Service vs. Business Unit Profit and Cash Utilization

In addition to supply chain profitability, trade-offs between service, profits and cash requirements or constraints can be defined.

3. What happens during a Supply Chain Network Optimization project?

There are three steps involved in Supply Chain Network Optimization:

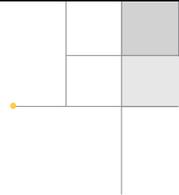
Baseline. In this step, all relevant data is collected to define the physical, service and cash flow for a business unit, typically during the last year. An “as is” model baseline is then simulated, with results reconciled against actual financial results.

Case Scenario. A case scenario includes a sequence of changes to the model to define the economics of new or different operational methods. The scenarios can be defined via a review of the baseline as well as via discussions with customers, sales, marketing, sourcing, production and distribution staff.

Plan to Implement. Cases are implemented that are, first, easiest to execute and, second, have the greatest economic value. Written plans (often in six sigma or equivalent format) are drafted to implement changes defined in the Case Scenario.

4. What is the economic impact of Supply Chain Network Optimization?

The value of Supply Chain Network Optimization is typically very significant; the *potential* contribution impact is often greater than 3% of sales. Depending on the business unit’s ability to modify physical or service constraints, the typical *realized* savings in the 1st year of operation are 0.75% to 1% of sales. Inventory or working capital reductions of over 20% are not uncommon. Service level and reliability also can be dramatically improved when the economics of constraints within the supply chain are rigorously defined.



5. How is the industry utilizing Supply Chain Network Optimization for best ROI?

There are three types of Supply Chain Network Optimization, all of which are increasingly broader definitions of “The Network”:

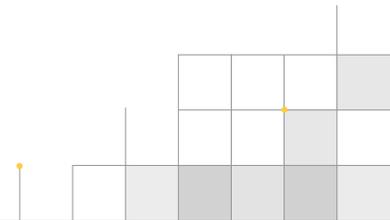
The Logistics Network – Service vs. Cost. In this traditional network definition, the key economic metric is logistics cost - specifically, the cost of inbound and outbound freight and distribution expenses. In this optimization method, service is optimized vs. logistics costs, which are roughly 8% to 15% of the business unit sales. Typical savings potential is 10% to 20% of logistics costs, which is equivalent to over 1% of sales. The “cost-to-serve” model is defined at numerous levels within the business unit including category, region, customer, and product family.

The Supply Chain Network – Service vs. Profit. This analysis takes a much more comprehensive view of business unit economics. In addition to the costs of the logistics network, the economic metric is profit or contribution, which includes sales revenue, raw material sourcing costs and plant operating costs. In this type of modeling, the economic potential impact is well over 2% of sales. Inventory reductions of over 20% are not uncommon. The “service vs. profit” model is defined at numerous levels within the business unit, including category, region, customer, and product family.

The Business Unit – Service vs. Profit AND CASH. In the post-2008 (new world) operating environment, many companies are focused on optimizing Service vs. Profit and Cash. Optimizing cash, which includes higher working capital costs and constrained availability of cash (from operations and financing), is essential in the new world. In this type of modeling, the potential economic impact is well over 3% of sales. Overall working capital reductions of over 30% are common. The “service vs. profit and cash” model is defined at numerous levels within the business unit, including category, region, customer, and product family.

6. How do Distribution Centers play an important role in Supply Chain Network Optimization?

Having the “right” location for a distribution center can drive significant cost savings. The Level of Service (LoS) is often defined as the order-to-ship plus ship-to-delivery time in days. Customers like stringent (low) LoS levels; however, low LoS drives significant costs in the supply chain. Most companies today have a service profile where 30% to 50% of their customers require an LoS of two days or less. Therefore, products must be stocked within 500 miles of these customers. A service radius of 500 miles requires a distribution footprint of 8-10 stock locations for a U.S. business unit. However, the more stock points or DCs, the more inventory is required, making freight more difficult to route or optimize.



7. Who are the best candidates for implementing Supply Chain Network Optimization?

Logistics complexity and the desire for change are the key indicators for candidates. Business units with multiple and/or complex raw materials, batch or semi-continuous production processes, a wide variety of distribution modes, containers and customer ship-to-locations have the greatest potential benefits.

8. How often should Supply Chain Network Optimization be implemented?

A typical business unit should re-simulate a network annually or when business dynamics change. Given the dramatic business changes in the last year, most business units should strongly consider the economics of the “right sized” and, more recently, the “cash optimized” network.

9. Is Supply Chain Network Optimization the only strategy for optimizing the supply chain?

Network optimization is not the only way to improve supply chain operations; however, it is one of the most comprehensive and mathematically rigorous methods of redefining logistics operations. It is the only business technique that: quantitatively defines service, cost, contribution and cash; presents the related trade-offs between these and other business variables; and prescribes a course of action.

10. How can a business implement an Supply Chain Network Optimization project?

While some larger corporations have dedicated staff to optimize their own operations, small- to mid-sized companies may find it more economically feasible to use outside consultants with the logistics expertise and resources to supplement their own in-house task force.

Do It Yourself. Many large chemical companies (> \$10 billion) perform these projects all the time using in-house staff specializing in Operations Research or Quantitative Analysis. Over the years, these companies accumulate significant experience as they have a dedicated staff performing these types of projects all the time.

Outsource. Mid-sized companies find it best to utilize an experienced third-party consultant. Generally, the smaller boutique firms offer more specialized experience than the larger, well-known, general-purpose consultants. When looking to outsource, evaluate companies that specialize in your specific industry and already have the expertise, resources and associations to conduct complete initiatives or to provide an assessment from which a project plan could be developed. A project team composed of corporate staff members and consultants is ideal to get the best results from an optimization project.

Consultants often utilize network optimization and simulation tools in conjunction with transportation modeling or inventory optimization to create optimal scenarios and “what if” alternatives. Most mid-sized companies cannot afford to implement and maintain these types of software packages in-house. Once a partnership is forged, consultants often retain project data to answer questions, evaluate implications of future corporate changes on an existing supply chain and make recommendations over time. For more information on how to get started with your own Supply Chain Network Optimization project, visit www.chemlogix.com or email information@chemlogix.com.

Ted Newton is an authority on global supply chain network optimization. He worked for more than three decades for Procter & Gamble in Supply Chain, Systems and Analytics leadership roles. In this article, he discusses the Optimization Challenge unique to specialty chemicals. He answers questions about analytics Best Practices (teams, tools and techniques) to optimize the specialty chemicals business unit. ChemLogix has a strategic alliance with Automated Decisions, LLC (ADC) to provide a Supply Chain Network Optimization Service to the chemical industry.

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