

Introduction to Supply Chain Network Design

Today's erratic economic conditions and incredible supply chain dynamics are causing manufacturing and distribution companies to increasingly turn to supply chain network design and optimisation as a strategic and tactical solution to help them satisfy customer demand, improve overall corporate performance and remain relevant in the volatile global marketplace. Being faced with continuous challenge to compete and succeed in today's marketplace, companies just can't afford not to explore the potential of network design and optimisation.

Designing a supply chain network is an essential process of evaluating alternative supply chain strategies and selecting the one that maximizes profitability and helps improve performance at each link in the supply chain. If delivered successfully, a network re-design and optimisation project promises to drastically improve a company's supply chain performance in a variety of areas:

- Reduced supply chain costs
- Reduced transportation costs
- Reduced inventory levels
- Improved product margins
- Increased manufacturing throughput
- Improved customer service
- Better return on assets

The optimisation process is done through network design modeling, which provides powerful decision support functionality to understand complex supply chain relationships.

Typical Network Design Problems

The question to ask yourself is does your supply chain network optimally support the business model and objectives? If you hesitate to answer, you might want to consider supply chain network

re-design and optimisation as a way to tackle the most challenging supply chain dilemmas your organization may face.

Supply chain network design problems are concerned with determining logistics infrastructure over a multi-year strategic planning horizon. The strategic decisions may include location and capacity of facilities and warehouses along with the sourcing allocations between them and customers. The objective is to provide the most effective solution so as to minimise total costs while providing your customers with the highest possible level of service.

By applying advanced mathematical technology, network design and optimisation can also help companies to determine optimal answers to various types of questions from the most strategic in nature to the most tactical:

- How will the cost of fuel impact the network structure?
- Should there be single or multiple sourcing?
- How would the number of DC's impact total costs?
- Where should each DC be located?
- What lead times should be offered?
- Where should the incremental capacity be added?
- Should I pre-build inventory or increase capacity?
- What is the impact of adding a new product?

Optimisation opportunities occur at every stage along the supply chain and the extent of a particular supply chain re-design effort depends on business considerations and the need to balance effort versus value returned.

Could Network Design & Optimisation Help Your Business?

Companies can save millions of dollars and significantly improve their supply chain performance by applying network design modeling and expert consultant services. Supply chain efficiency has a fundamental impact on the bottom line of both income statements and balance sheets of organizations.

The nature of supply chain network optimisation allows for an initial assessment of potential benefits before a large-scale project is started. The objective for companies would be to embed the optimisation results into the day-to-day operations, creating a sustainable competitive advantage.

Supply chain network design projects are usually accomplished in a matter of weeks and the payback is often realised within the first few months of implementation. Companies that focus on their supply chain network are often rewarded with a cost efficient and customer-responsive supply chain.

Typical Supply Chain Network Modeling Approach

Network modeling is a powerful tool to improve overall supply chain performance. A network optimisation process usually involves modeling a subset of a company's products across the supply chain to determine the inventory and customer service improvements that network design and optimisation will provide.

Whether your company is looking to reduce costs, improve customer service, or be positioned for future growth, network optimisation and modeling helps develop the implementation plans required to translate strategic decisions into reality. A typical approach for modeling the supply chain network generally involves the following phases:

- Phase 1 Gather data and establish current cost and service baseline
- Phase 2 Determine logistics scenarios
- Phase 3 Develop an implementation plan

In **Phase 1** of network modeling it is essential to gain a thorough understanding of your company's overall business requirements. During this phase, the project team commences with gathering, cleaning and validating operational and costs data on the current network. These baseline service levels and costs will be used as the benchmark against which all other options will be compared.

Phase 2 focuses on identifying the potential scenarios to model and conducting first level scenario analysis. In this phase it is also critical to clearly articulate the key constraints and key factors to be modeled in each scenario. High-level models are built to test the potential "what ifs" and calculate the appropriate cost and service levels. Each scenario is tested for 'robustness' and in so doing, serves to verify and validate the network model. Models are often estimated at the SKU level, with multiple time periods, and the entire end-to-end supply chains are evaluated.

It is important to note that the more precise a model must be, the greater the amount of data that must be collected, the greater the accuracy required of that data and the more challenging it may be to solve the model. Every effort should be made to create reusable models that may be re-applied for future studies.

Phase 3 in supply chain network modeling is the final selection and justification of the selected network. The results must now be compared with the baseline in order to build the business case for change. This includes defining specific operating procedures, material flow policies, inventory policies and load plans. We work together with each client to help develop a road map of how to change from the existing network to the desired future state and properly determine the one-time costs.

Supply Chain Network Design Software and Tools

The supply chain network design software and tools seek to optimise performance across an entire network. These tools help companies identify tradeoffs among cost, service and the amount of capital required to support the most efficient network.

The range of tools used to create a network model can vary dramatically in complexity and detail. Simple modeling problems can be solved using Microsoft Excel and Access based models. More complex problems may require a combination of linear programming and mixed integer linear programming models.

Depending on an organisation's needs, either cost calculators or advanced supply chain network design software tools can be used. Larger organisations (and more complex supply chain problems) may justify investment in advanced network design software tools to address specific business challenges on their own timelines. The advantage of these software tools is that the modeling constructs are often very similar to the modeling used for day-to-day supply chain planning activities. These sophisticated network modeling tools can also enable a company to increase its market share by leveraging the lower costs of an optimised supply chain.

For many companies who may have no need to review their networks frequently or merely want to quickly test a number of distribution network options at a high level may want to rent the software and have a qualified consultant team run the network modeling tool. Choosing a skilled team responsible for development of meaningful supply chain model and conversion of its output into a strategic plan is equally important as selecting the optimal network modeling software for your company.

Effective strategy development requires a blend of "art" and "science." "Art" is necessary for evaluating supply chain trends and prospects and

designing a sustainable network structure. "Science" is applied in the effective use of network modeling tools to create and evaluate potential logistics strategies.

A highly trained consultant team experienced in the use of advanced network design software and able to research potential strategies and analyse the operational impacts of various decisions plays a critical role in the success of any supply chain restructuring process.

About New World

At New World Business Solutions we offer a client-focused, collaborative approach and are committed to delivering our clients sustainable ROI and helping them quickly achieve high performance and measurable business results.

Our highly trained strategists and industry experts possess the necessary skills and experience to 'drive' network modeling software for optimal results, enabling us to provide our clients with efficient and effective supply chain strategies.

We work side-by-side with our clients to assess their requirements and determine the most appropriate modelling approach, including selection of network design software. In this way, we minimise time and investment typically associated with utilising sophisticated network software when frequently, the additional investment typically associated with these tools may not be necessary. In many cases, more cost effective modeling methods can be used to solve less complex network problems.

For more information, please contact Richard Koch, +61.419.689.843 or visit us on the web: <http://www.newworld.com.au>.