Real-World Network Optimization

Focusing on hard questions – not just collecting data – yields better solutions

White Paper

By Ashutosh Dekhne
Supply Chain Engineer
Contract Logistics – U.S.

Logistics network optimization can yield significant systems-wide warehousing, transportation and inventory savings. But many companies mistakenly conduct optimization studies that are almost exclusively data driven.

A better solution:
A six-step approach that weighs the strategic and practical, in conjunction with data analysis, to deliver optimal results.

KUEHNE+NAGEL

7/04

Logistics network optimization involves an analysis of data and strategy elements to determine the number, size and location of required distribution centers in order to achieve the optimal balance between service levels and logistics costs. While it's a sizable undertaking, network optimization can yield service improvements and significant savings in system-wide warehouse, transportation and inventory costs. A growing interest in network optimization among cost-conscious logistics professionals has driven significant growth in the market for "optimization" software in the last five years.

But many companies mistakenly conduct optimization studies that are almost exclusively data-driven. The assumption: plug in the relevant data on size, weight, volumes, ship-to points and other factors and output the ideal network design. However, in focusing too much on the modeling exercise itself, companies can miss the strategic and practical context for the analysis. This can have serious and expensive consequences. For instance, will the customer base and shipment characteristics used for the analysis change over the next five years, driving up the cost of the once optimized network? Or, will a requirement for a large and ready supply of temporary labor for seasonal spikes cripple your service if the chosen distribution market cannot support such a requirement?

No optimization software can consider these critical, but less data-driven, factors.

The capability of optimization software has improved greatly over the last five years and now enables highly sophisticated analysis. But logistics professionals should rely on network modeling tools as decision support tools, not as the ultimate determinant of a distribution network design. A better approach is to combine these tools with a "top-down" design approach that includes a detailed understanding of the company's present and future business strategy and the practical implementation requirements that could impact the recommendation.

This paper will first discuss the shortcomings of typical network optimization projects, and then suggest a six-step approach that considers the strategic and practical context of the study and how it integrates with data analysis to deliver a truly optimized recommendation.

Avoiding "Optimization As Usual"

Companies seeking to optimize their distribution networks spend much of their project time collecting data and developing precise operational cost estimates to meet a software package's data requirements. A significant effort is required to process, check, and validate this data. Few, if any, business meetings are held outside the analysis group, few customer meetings and not much time is allocated to defining service parameters. It's about the data. While important, compiling this data is secondary to a clear understanding of overall corporate strategy and its impact on the supply chain.

The questions that don't get asked are those that are usually harder to answer, for example: What's the likelihood of future growth? Will acquisitions or divestitures play a part? What are the key service requirements of today's largest customers? Will they be changing? Who are key suppliers today and tomorrow? Will any or all manufacturing move off shore?

These questions require direct interaction with the top management of the company, including the senior operations, finance, sales and marketing executives. It's impossible, therefore, for the project to be contained within "the logistics group." High-level sponsorship is necessary and should be sought at the start of the project.

- *Example:*
  A home-improvement products company conducted a "successful" supply chain network modeling exercise and revamped its entire distribution network. Just three months after implementation, however, the company purchased another company with distribution center locations that overlapped its own. The result: redundant distribution centers and inventory duplication.
  ***Lesson**: By considering the strong likelihood of an imminent acquisition, the company could have better positioned itself by either delaying the optimization implementation or considering potential harmonization of the two supply chains*

By exploring fundamental business questions at the start a company can be sure that its distribution network will support

its overall business strategy, not burden it with unexpected costs.

Of equal importance to the strategic business context is the practical operational context for the network recommendation. In the typical approach, locations are often selected before implementation issues are truly understood. Implementation is seen as a separate "Phase II" concern. But considering implementation issues early in the analysis is critical.

Relevant questions would include: What's the availability of skilled labor in potential markets? Will there be an impact on the existing workforce? Are government grants or incentives available in alternative locations that could positively impact the economic viability of certain markets?

- *Example:*
  An importer and distributor of bearings conducted a supply chain network optimization study to improve costs and achieve faster time to market. Besides recommending an optimal distribution network, network analysis indicated the cost effectiveness of importing through a Southeastern port. The company completely realigned its distribution based on the results of the network modeling. All worked well until demand and volume at the port increased. The port's capabilities hadn't been considered during the analysis. As a result of an insufficient infrastructure, the port was overwhelmed and unable to efficiently manage the increasing volumes. The result: delays in container processing at the port, which led to product shortages and angry customers.
  ***Lesson**: Not considering all implementation-related issues directly led to the failure of the company's optimization effort.*

Decision-support software is a significant aid for making sense of reams of data, but don't underestimate the value of street smarts in conducting your network optimization. Sometimes your best friend is the battle-tested veteran of 75 warehouse start-ups, providing practical insights to ensure that the recommendation makes sense and can be implemented cost effectively.

Six-Step Approach to Network Optimization Projects

The accompanying diagram outlines a sequential six-step approach to network optimization projects that, if followed, should lead to sound recommendations that won't be second-guessed after 12 months. Following is more detail for each step.

Step One: Define objectives within business strategy

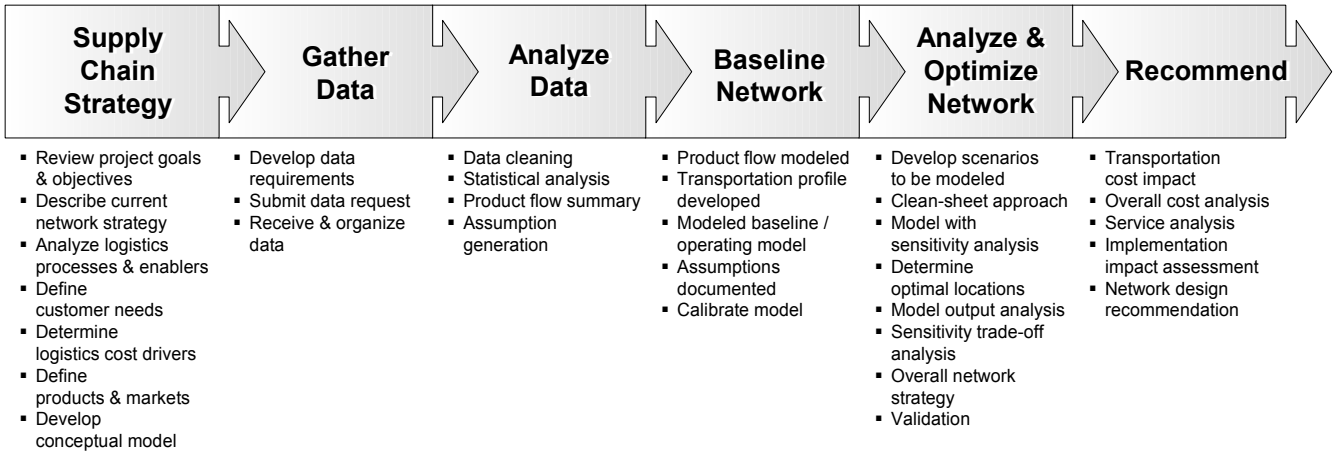
How does one ensure an understanding of a company's strategic goals? First, project leaders need to step outside the logistics box and listen. Logisticians should meet with senior executives to explore how the supply chain must support the company's profit model – now and in the future. To do this effectively, it's essential to secure executive-level sponsorship and involvement. Talking to key customers and suppliers to understand their needs also is important because their service requirements can dictate the extent of supply chain changes. Since an optimization may yield an advantage that blunts competitors' approaches, time should be spent understanding their network designs.

Step Two: Gather data

Designated contacts should be determined to validate data accuracy and completeness; an optimization effort's success depends upon it. This is particularly important when an outside party, such as a third-party logistic services provider, is conducting the analysis, since poor data will lead to a poor analysis. Some companies are embarrassed to discover they lack important data. The cause isn't lost, however, because data can be mined. Veteran logistics analysts are experienced at digging out information from a variety of sources, including carriers, distribution centers and ERP systems.

Step Three: Analyze data

Invariably, some data may appear inaccurate given the magnitude of the data collection effort, which often can surpass more than 150,000 records. Data inaccuracy issues must be discussed with the company prior to modeling to determine the proper course of action.



This network modeling methodology is a proven approach to successful network optimization. Often the first step – understanding how the "optimized" supply chain supports a company's overall business design – is skipped as companies focus on data gathering and analysis.

For instance, while only a statistically small amount of data may appear incorrect, it may represent an important modeling component. Before logisticians remove or extrapolate that data, the company must understand the potential impact and agree to proceed. Analysts' assumptions must be validated. In one instance, a company wasn't aware of – therefore never mentioned – the seasonal variability of portions of its business. Only when logisticians came back with data that clearly indicated inventory spikes in certain months did it realize the extent of seasonality. The information was incorporated into the optimization analysis and also drove the establishment of better forecasting methods. In another example, data indicated some shipments left a distribution center with peculiar weight information – multiple shipments of exactly 99.9 pounds. Could DC associates be keying in a "dummy weight" of 99.9 pounds to meet fast-paced shipping requirements? Logisticians were able to confirm their hunch by getting the historic data from the carrier. They pointed out the ramifications of the issue (e.g., inaccurate transportation cost budgeting) and the company launched a training program on the importance of weight-capture accuracy.

Step Four: Establish accurate baseline

Setting up an accurate baseline – the supply chain as it has historically operated – allows for an accurate comparison against potential future scenarios. To the extent possible, anomalies are eliminated and assumptions are carefully checked, so that the baseline is properly established. If the company believes its transportation costs are $2 million annually, for example, the data collected and reviewed by analysts should be reasonably close to that figure. If it is, the model should work well as a baseline for future scenarios. If there is a discrepancy between company beliefs and data results, logisticians must review with designated company contacts to validate the company beliefs and/or readjust baseline assumptions.

Step Five: Analyze & optimize network

At this stage, various scenarios – based on the previously discussed supply chain strategy – are developed for modeling. Cost is an important factor, but factors such as delivery reliability, timeliness, and compatibility with production plans are also important elements of the decision process. The network should be analyzed with these multiple variables in mind. Logisticians can use sensitivity analysis capabilities of optimization software to measure the impact of changes in one variable on others. For example, if a product currently requires 48-hour delivery service, what might the impact be if requirements were relaxed to 72 hours? Is such an adjustment possible? If so, the possible effect as product is concentrated in fewer locations could range from fewer cross-docked items, to reduced transportation costs, to a potential reduction in DCs.

Logisticians now combine the power of the models with their expertise to create multiple "what-if" scenarios, directly linked to the overall business strategy. Potential solutions may range from minor modifications to dramatic overhauls impacting the entire organization. Often a company's over-familiarity with its business can blind it to opportunities that may initially seem extreme. By raising multiple scenarios, logisticians are able to offer a range of

possibilities previously not considered.

Step Six: Recommendation

In the final stage, real-world logistics experience must be brought to bear to calculate the impact of intangible elements. For instance, an "ideal" modeling option may seem to call for locating a DC in a region that happens to be rural. The "solution" is rendered impractical, however, because the area lacks an available labor pool to allow rapid ramp up from 20 to 200 employees. In another example, one city may be the "ideal" geographical spot, but locating across the state line yields significant state incentives that more than make up for any higher transportation costs. This knowledge comes from an understanding of actual business dynamics far beyond modeling software and spreadsheet analysis.

Following these six steps should yield an optimization recommendation that can generate meaningful network improvements, as in the case of a leading manufacturer struggling with an outdated supply-chain strategy and a lack of in-house expertise. Problems included too many distribution points due to a major acquisition, which added an entire distribution infrastructure to its own. This resulted in multiple shipments from different locations to fulfill a single customer order. Making matters worse, the company faced global integration challenges, increasing inventory levels and the elimination of capital for new logistics centers.

The company saw these issues as an opportunity for network optimization. Instead of immediately creating data models, it and its 3PL partner held in-depth sessions, with senior leaders on both sides, to map out an optimized solution that was driven by long-term corporate strategy. While this delayed the data gathering and analysis process it was critical to gaining internal acceptance and full understanding of future strategies.

Armed with this knowledge, the 3PL was able to recommend a solution that enhanced the company's competitiveness, establishing an integrated supply chain linking suppliers, internal processes and customers. The solution focused on customer service requirements while lowering logistics costs, including inventory, helping the company toward its objective of cutting logistics costs by $40 million over five years.

Conclusion

A word of caution from earned experience. As seemingly exhaustive as the optimization process is, companies should never take the output as gospel. For instance, don't book those "savings" for budget purposes; use them as rough guides. Operational mistakes will still be made (shipping to wrong addresses that lead to returns), new systems will come on line, demand may exceed supply, etc. Instead, use the optimization as a road map, thought out to the extent possible, but one that may require detours along the way.

Remember that focusing exclusively on network modeling without regard for larger strategic or systemic ramifications can often result in sub-optimal results. Logistics professionals should rely on modeling tools as decision support, not as infallible oracles of the "perfect" distribution solution. Only by blending such tools into a detailed understanding of the company's present and future business strategy and the practical implementation requirements that could impact the recommendation, can a network optimization generate real logistics cost savings.