



Meeting E-Commerce Network Challenges

Network optimization is vital to keeping retail supply chains humming. BY JEFFREY B. GRAVES

Distribution network optimization is a structured process for determining optimal throughput quantity, facility location and operating costs associated with the movement of merchandise within the supply chain. Because market conditions are constantly changing, logistics executives must adjust their perspective and planning to ensure that the company's stores and end consumers are receiving shipments as planned, while utilizing the most efficient and cost-effective facilities and systems. Nowhere is this a bigger challenge than in retail e-commerce fulfillment.

Rising transportation costs, caused in part by the volatility in fuel prices, are often a prime driver of distribution network change. This volatility prompts logistics executives to re-evaluate the locations of distribution

centers (DCs) to minimize shipping costs. A network strategy worked out four years ago when fuel was \$3 per gallon, might not be the best strategy now when fuel costs are 30 percent higher.

In addition to escalating fuel costs, rate increases, driver shortages and new labor laws can also drive up transportation costs.

Another strong driver for network optimization is the onset of e-commerce consumer demand for free and fast delivery — 24 to 48 hours — causing distribution executives a considerable challenge to remain competitive while keeping picking, packing and shipping costs under control.

As brick-and-mortar retailers integrate e-commerce and transform into truly omni-channel fulfillment organizations, they increasingly seek to leverage the inventory in their supply chains. Retail store orders may

involve shipping full or mixed pallets of product to arrive within a one- to two-week delivery window, while an e-commerce order might consist of several, different-category single items wrapped in a custom package delivered within one to two days.

Another scenario involves retailers who have eliminated the differentiation between store replenishment and consumer fulfillment by leveraging their entire inventory to fill customer orders of varying types. The challenge relates primarily to having the right systems in place to dynamically process orders for e-commerce channels while maintaining systems for retail store replenishment.

In many scenarios, either separate DCs within the company or outsourced, are needed for the processing of these e-commerce orders. However, more progressive retailers have begun using the inventory at their stores to fulfill direct-to-consumer orders, creating significant cost and service benefits. The downside is this creates additional complexity for the distribution network.

Increasing SKU counts, particularly with e-commerce (but growing throughout all distribution sectors), puts an increased demand on space utilization within DCs. Just-in-time delivery of smaller orders to retail stores is pushing inventory storage back to the DCs and manufacturers. Logistics executives are adjusting to these dynamics by re-utilization of their DCs.

Corporate mergers and acquisitions, where each party operates multiple and overlapping DCs, is another driver for network optimization. Companies experiencing rapid growth because of an upturn in the overall economy, or when a consolidation of DCs is needed because of an economic downturn, are prime candidates for distribution network optimization.

The Panama Canal expansion is an example of a major change that triggers the need to reexamine an organization's distribution strategy. Targeted for opening in 2015, the expanded waterway will permit more containerized freight to reach eastern U.S. ports in less time and for lower cost. This will ease up the necessity to utilize crowded container-loading/unloading terminals and DCs along the west coast.

Logistics Questions

Logistics executives frequently ask: "How can we reduce inbound and outbound transportation costs, inventory and inventory carrying costs, and fixed and variable costs within our distribution network? How many distribution facilities are needed to optimize our customer service at the lowest total cost, factoring transportation, facility, labor, equipment and inventory? What should our optimal distribution network look like to maintain or improve customer service while lowering overall distribution costs? Where should these DCs be located? What size and configuration should they be?"

These questions can be answered with a refined distribution network strategy and an associated distribution network optimization initiative. The distribution network strategy encompasses many supply chain factors influencing a company's initiatives to bring products to market, including:



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- strategic product sourcing
- supply chain vulnerability
- throughput capacity
- mergers and acquisitions
- inventory
- omni-channel requirements
- warehousing
- transportation
- outsourcing
- labor procurement
- capital investment
- ROI and profitability.

Because of the complexity associated with distribution network analysis and the infrequency of this type of initiative, astute supply chain executives leverage independent logistics consultants to conduct and manage distribution network projects. With the skilled personnel, extensive case history databases to draw upon, and in-depth experience with precision analytics and financial modeling tools, consultants are ideally equipped to fully analyze and develop conceptual designs for even the most complex supply chain and distribution network scenarios.

Components of Network Optimization

Developing a successful distribution network optimization plan poses significant challenges, even for the most seasoned supply chain executives. It requires an in-depth understanding of every element of the company's

supply and distribution network. Additionally, precision analytical capabilities, utilizing the most advanced data analysis and modeling tools to handle very complex data integration and interpretation, are an absolute necessity.

Objectivity in assessing network solutions is key here. Drawing on experience from many network optimization solutions that have been used in varied industry applications provides a broader perspective on potential solutions that might not otherwise be considered. This depth of experience can make the critical difference in developing a network strategy that will meet the requirements for throughput and efficiency, minimize capital outlay and deliver the expected return on investment with an optimal balance of transportation costs, labor, systems and facilities.

The components comprising a comprehensive distribution network optimization are organized into five primary functions:

Data Discovery — Data discovery is the precise detailing of a company's distribution network. This is the initial step. Both business and facility discovery identifies assets, capacities, facilities, operational processes and performance. This process incorporates such critical factors as supplier sources, transportation costs, regional labor availability, property information, customer and store locations, etc. Data discovery also includes interviewing stakeholders from not only logistics, but from every aspect of the company. This is necessary to understand the pain points and potential bottlenecks in the organization that influence distribution. Supply chain executives typically underestimate the scope and volume of data required for a comprehensive data discovery.

Predictive Analysis — Predictive analysis is used to determine future infrastructure requirements. "What-if" analysis is used to show the tradeoffs of various demand levels with different network configurations. This is both a qualitative and quantitative assessment. This step analyzes findings, observations, alternative options, and the business case for action. It should provide an assessment of opportunities and change impact, prioritization, timelines and transition planning.

Baseline Model — Utilizing information gained from Data Recovery and Predictive Analysis, a baseline model is built of the existing distribution network, to which alternative scenarios can be compared. Used properly, the baseline model is a precision valuation tool with high accuracy.

Modeling — Given fixed or variable inputs, modeling will process events and calculations to produce scenarios for expected throughputs. Multiple scenarios can be derived, based on projected requirements, using software modeling tools such as Insight's Supply Chain Optimizer (ISCO), or Llamasoft's Supply Chain Guru. Modeling enables the supply chain team to develop alternative supply chain networks focused on minimizing costs, and maintaining service levels.

Strategic Plan — Once the supply chain model is defined then a distribution strategic plan is developed that aligns the company's business, technology, operations, vendors and customers. Fundamentally a strategic



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transition plan, it lays out for supply chain executives how to go from the existing configuration to the optimal. The steps include facility role and configuration concepts, operational process flows, implementation timelines, and a market impact assessment. A critical component of the strategic plan is detailed financial projections, prepared on a year-by-year basis and extending out five years. The five-year plan typically includes capital investment requirements, network costs, expected cost savings, cash flow, and ROI (including the internal rate of return).

Assuming that the above steps are conducted comprehensively, the resulting strategic plan provides a comprehensive roadmap for achieving an optimal network configuration, and permits tactical implementation plans for moving forward.

From Strategic to Tactical

Conventional distribution network optimization focuses primarily on transportation and facility location, without addressing equipment selection and implementation within the four walls of the DCs. But a network optimization plan can be extended and integrated, permitting distribution executives to connect seamlessly into facility planning and IT/material handling equipment selection and implementation. This integration will give supply chain executives a comprehensive view of the solution, something not generally included with a traditional network strategy plan.

Designing and implementing an integrated, seamless solution will simplify the transition to new or retrofitted DCs from current facilities by incorporating and coordinating all aspects of the material handling and information systems implementation within these DCs. This facilitates a more streamlined and efficient total project approach. This integrated strategy provides a higher

probability of bringing the facilities online, both on-time and within budget.

Change management, which enables the critical link from a network strategy plan to the smooth implementation and transition into an upgraded DC network that is a functionally efficient live operation, is a critical success factor that cannot be underestimated. Inadequate change management can be isolated as a prime reason why upgraded DC networks do not operate at targeted capacity when going live. Despite its importance, successful change management strategy is seldom fully embraced by those responsible for distribution network initiatives.

For example, throughout the tactical implementation of a network strategy, the coordination of site and transportation factors, coupled with IT and material handling systems installation, equipment testing, system conversions and equipment start-up is critical to ensure the interlinked systems within the DCs come online without interruptions. Even before the go-live or switchover takes place, it is vitally important for the DC staff to be fully trained in all operations of the DCs. This includes integration with the company's core systems (ERP, OMS, WMS, TMS, etc.) to enable receipt of orders, WMS/WCS operation, inventory storage systems, picking, packing, sortation, shipping, transportation and the dozens of sub-functions involved with the operation of the network DCs. This requires considerable coordination between equipment manufacturers and installers, the DC executives and operational personnel, and the company's executive management.

Unless the issues inherent in change management are fully addressed, the new DC network will not operate at full functionality no matter how streamlined the network optimization plan would indicate, or the automated equipment solutions might be.

Optimization Frequency

How often should logistics executives consider optimizing the company's distribution network? Once a comprehensive network optimization is done, logistics consultants recommend an annual network rationalization to ensure that factors which impact transportation, service and costs are reexamined. It makes sense to revisit the criteria that were used and substantiate that the network is staying current. Then, if changes need to be made, the impact on service and costs will be minimized if caught early.

Properly executed and regularly maintained, an optimized distribution net-

work will define the requirements for achieving targeted throughput and efficiency, minimize capital outlay and deliver the expected return on investment with an optimal balance of transportation costs, labor, systems and facilities. **WT**

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