

LEVERAGING BIG DATA TO MANAGE LOGISTICS

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FOR MANY MAJOR B2B enterprises, logistics networks have never been more complex. The increasing prevalence of operations that are global—with growing numbers of production sites and clients that could be anywhere on earth—has introduced challenges that didn't exist to the same degree at an earlier time. The good news is that there has also never before been a moment when there were more tools and more opportunities to optimize logistics costs than now.

Most B2B players have already improved their ability to minimize logistics costs on a route-by-route level. They know how to find the least expensive route for shipping products from a given production facility to an individual client location.

However, few have a holistic view of their logistics network or of the associated costs. Such a view considers all supplier and customer flows simultaneously. It tracks not only transportation and handling but also warehousing and inventory working-capital costs, specifically by end customer. Without

such a picture, companies might miss opportunities to capture greater value from their network.

The incomplete view that most companies have of their transportation costs is the result of a siloed organization structure that has each part of the business focusing on a single aspect of logistics. For example, one part of the business might be responsible for shipping from plants to warehouses. Another might manage allocation of customers to specific production facilities. A third might be in charge of negotiating rates with carriers.

Some organizations segment supply chain management by customer or channel and duplicate network structures. And in many cases, inbound-logistics management is separate from outbound—or simply not directly managed—creating major backhaul inefficiencies, particularly in remote areas. Managers in each part of the business strive (understandably) to optimize logistics costs for their own silos but might not factor in the interdependencies. They

might not even be aware that their decisions could result in higher costs for other parts of the business.

Five Levers for Optimizing Logistics Routes

Instead of taking a piecemeal approach, companies need to manage their logistics networks holistically. This means looking at all product volumes and all possible routes flowing from suppliers to production facilities and customers, considering the impact of each decision on total logistics costs, and making trade-offs as needed to optimize costs throughout the chain. To achieve all this, supply chain leaders can activate the following set of five levers:

- **Mode and Route Mix.** Managers must determine which configuration of modes (such as truck, rail, and boat) over which routes and junction points will optimize the flow of goods in terms of cost and lead time. They must assess the trade-offs and implications for inbound and outbound logistics, including potential synergies with supplier and customer networks through backhaul optimization.

For instance, on the surface, one-way shipping by truck along a particular route might be more expensive than shipping by rail. However, if there are backhaul loads, it might be less expensive. Shipping small loads is not optimally efficient, but it can speed delivery time, decrease in-transit inventory, and make the most of working capital.

Finally, adding transloads at junction points might increase handling, but it can also help reduce overall costs if the company can build scale or access a lower-cost transport mode (for example, ship instead of rail). All these factors merit careful consideration.

- **Warehouse and Distribution Center Network.** Managers should carefully consider the number of warehouses and distribution centers (DCs) their company needs, where those DCs should be

located, what products they should host, and which suppliers and clients they should serve. It's useful to determine whether serving different customers from particular warehouses or having one DC host multiple products could help optimize asset utilization for the company's carriers, thereby enabling managers to negotiate lower shipping rates.

- **Production Origin and Destination Swaps.** Companies might create arbitrage opportunities by reallocating products and clients to specific production facilities in ways that reduce overall distances and costs. Clearly, the business will need to weigh the relative benefits of the change against capital implications and operational constraints. In many cases, it's possible to make small production tweaks at reasonable cost, and such changes can lead to material logistics savings.
- **Shipment Consolidation.** A close examination of a company's production schedule could reveal ways to consolidate shipments in order to maximize the utilization of the business's own equipment as well as its carriers'. For instance, a company with enough rail-shipment volume might be allowed blocks of railcars or unit trains.

Ways of building bigger shipments include holding inventory, establishing a hub, and clustering volumes with other companies. The result could be increased leverage with carriers and avoidance of switching costs, enabling the company to ink better deals on shipping rates.

- **Shipping Rates.** Companies need transparency into pricing and cost structures (including base rates, fuel surcharges, handling fees, and third-party equipment and lane fees) across modes and routes. They can achieve this transparency through broad market tenders and "should cost" modeling. Such knowledge, which is critical for optimizing mode and route mix, helps managers

identify specific routes for which the business might be overpaying.

To have any leverage, companies must generate competition among shippers by exploring routes with alternate modes or carriers. It's important to assess and understand where the business might have this kind of leverage and, using a carrot-and-stick approach, to apply it strategically.

For instance, managers might explore opportunities to increase a carrier's volume for some routes in exchange for more competitive rates on routes lacking alternatives (carrots). Or they could threaten to reduce volume in situations that offer no alternatives if a carrier doesn't agree to the target rates (sticks).

gers trade-offs in others. Companies must make these trade-offs with an eye to the impact on overall logistics costs. To optimize costs holistically across its supply chain, a company needs to consider all levers simultaneously.

The number of parameters and possibilities is mind-boggling. Consider a company that ships metal products in North America. To determine the best way to manage the outbound distribution of products throughout the continent, the business might have to consider a network comprising more than 500 nodes—plants, clients, transload locations, and warehouses. Furthermore, the company might also have to consider as many as 100,000 arcs: the arcs represent the various modes of transitioning from one node to another and comprise millions of miles of roads, hundreds of thousands of miles of rail, and a waterway network. (See the exhibit below.)

Deploying Big-Data Analytics

Knowing which levers to pull, when, and how isn't easy. The levers are interdependent, and a change in one generally trig-

To optimize such a network, a company would have to analyze as many as 100 bil-

Picking the Right Route Is a Complex Process

MULTIPLE NODES AND MODE-ACCESSIBILITY OPTIONS....



... AUGMENTED WITH 3 MILLION MILES OF ROADS, NEARLY 200,000 MILES OF RAIL, AND A WATERWAY NETWORK

Network nodes (client example)

X current production facilities

X customer demand locations

Warehouses X existing locations
225 potential locations

- All junction points
- Rail-truck transition nodes

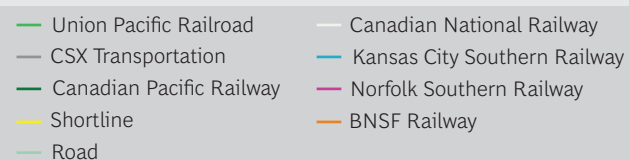
15 ports

West Coast

- Origin: X, Y, Z
- Destination: Seattle, Vancouver, Long Beach

East Coast

- Origin: X, Y, Z
- Destination: Baltimore, Veracruz, Charleston, Savannah, Mobile, Oswego, Toledo, Detroit, Chicago



Source: BCG analysis.

lion possible combinations. Moreover, external cost drivers—such as demand for particular commodities, locations and number of suppliers and clients, fuel and commodity prices, and foreign-exchange rates—are continually changing. A solution that optimizes logistics costs under a single set of conditions could backfire should one or more of those conditions shift.

Many supply-chain leaders know that evaluating all of these factors is the right way to solve the problem, but doing so is not always practical. Because the range of variables is so wide and the volume of data that companies need to access is so huge, few companies have enough talent or time to arrive at actionable conclusions in today's fast-changing environment. But thanks to advances in big-data analytics tools and approaches, optimization has become far more feasible.

Getting Started

To begin optimizing total logistics costs using data analysis, supply chain leaders should first gather stakeholders from different parts of the organization to build a clear picture of the business's current logistics network. Together, group members should map the locations of the business's suppliers, clients, plants, warehouses, DCs, and modes.

The next step is to identify the company's biggest cost drivers, including particular modes of transportation, inventory in transit, and specific types of equipment. Management should also determine the compa-

ny's current constraints, such as lead time obligations to clients and production capacities of various plants.

It is important to determine whether these constraints are truly etched in stone. For instance, management might assume that a particular customer requires daily shipping, but the customer might, in fact, be happy with a more flexible shipping schedule. At this stage, it's also critical to understand the value of all the potential alternatives by, for example, executing a broad tender process to gain a full picture of true market rates.

Supply chain leaders will need a team of logistics and modeling experts to build a network optimization tool that accounts for all of this information. Armed with this powerful tool, they will be able to tune the company's logistics network across a number of variables, experimenting with changes in assumptions and current constraints in the network. They will also be able to test each scenario's potential impact on the business's overall logistics costs and to generate alternative logistics strategies across modes to strengthen the company's negotiating position with suppliers.

With such a capability, the business will be able to create a detailed picture of its options for manipulating the five levers to optimize logistics costs across its entire supply chain. Although it's just the beginning, gaining this picture is a vital first step in surmounting the complex logistics challenges that face companies today.

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