

Our point of view

Analytics in a time of supply chain crisis

Unmatched Supply Chain Challenges

Supply chain professionals are accustomed to occasional disruptions. COVID-19, however, changes the game. First, the problem extends beyond a single location or region; this is no warehouse fire or Gulf Coast hurricane. Moreover, both the demand and supply sides are profoundly affected. Finally, we really don't know what will happen next, how long the disruptions will last, nor the sequence in which disruptions around the globe will resolve.

Everyone is scrambling to keep things moving. Supplier capacity can plummet with one COVID-19 diagnosis in a facility. Office workers have been redeployed as delivery drivers or warehouse workers. Conventional wisdom about consumer

preferences no longer applies in the wake of stay-at-home orders. A deep understanding of one's supply chain is even more important than usual in such an uncertain environment.

Current events reinforce our long-held belief at End-to-End that you need advanced analytics to address the complexity of today's supply chain challenges: highly constrained supply systems and unprecedented changes in buying behavior. We anticipate a repeating pattern of shutdowns and ramp-ups in months to come. Insights from modeling and analyzing different scenarios should guide the actions taken by affected firms. We describe a few techniques here that can be deployed to support that cause.

Scarce Resource Allocation

In a constrained environment, we generally recommend focusing on three things:

- Increasing end-to-end supply chain visibility to identify constraints.
- Prioritizing demand to identify the orders to fill first.
- Allocating constrained resources to maximize demand fulfillment.

Data distributed across multiple IT systems or buried in spreadsheets compromises supply chain visibility. Resilient supply chains can pull the data together quickly to enable planning and what-if analyses. We recommend a single database for this, architected for the task and set up to collect, clean, and organize the data automatically. Tedious, manual curation of data does not work in today's world.

Next identify the orders to focus on when demand exceeds supply. Define and document your organization's priorities and follow the rules as uniformly as possible. For example, prioritize shipments supporting firm customer orders over orders based on anticipated future demand. Expected profitability is another good metric. Once implemented, the rigor of this approach delivers high value. Moreover, the logic can be automated, eliminating the need to evaluate each new order by hand.

Adaptive Demand Forecasting

COVID-19 has upended the task of demand planning. Supply chains today fall into two camps: those reacting to a big drop in demand and those facing unanticipated increases. Both sides wrestle with how long this will last and whether it represents "our new normal."

Consider different phases of the demand forecasting challenge. First, what will short-term demand be? Then, what will long-term demand look like once things return to a semblance of normal? Critically, then, what will be the path in between as businesses ramp back up?

We foresee problems coming from distorted data inputs more than from fundamental limitations of forecasting methods. However, the usual algorithms can't distinguish low demand due to unpopular products from low demand caused by the abrupt shutdown of stores. On their own, they won't account well for today's unusual circumstances. They will simply look for recent events to repeat.

Supply visibility and prioritized demand enable the final step: the allocation process. A planning engine can allocate constrained resources to maximize the number of high-priority orders filled. This process might be executed weekly under normal circumstances, but now it should be refreshed daily. Doing so captures all last-minute changes on both the supply and demand sides.

Companies might cleverly override their history to generate future forecasts. Alternatively, they can apply quick-adapting machine learning algorithms, perhaps augmented by human insight.

Machine learning models can be complicated. However, they have compelling applicability for situations like the COVID-19 crisis. Firms will be well advised to adopt ML models to help with forecasting through the short-, mid-, and long-term phases of recovery. They can capture the impact of outside forces and address changing customer buying behavior – both in the early phases and during the transition to normalcy.

Comprehensive Scenario Planning

Scenario planning has been around for a long time, but few firms execute it well. Most “scenarios” amount to little more than best case, worst case, and most likely case. These often translate to simply bumping the financial forecast up by 20% or down by 10%. From a supply chain point of view, that adds little value.

Consider more carefully constructed scenarios, especially in today’s environment. For example:

- My baseline says our stores across the U.S. will open in a month. What if it’s two?
- My baseline says our supplier will provide 80% of previous open orders. What if it’s 60%?

A scenario should include realistic details. The factory above, dependent on those specific raw materials, must anticipate not being able to build the corresponding products. What then? The resulting plan may be down just a few percentage points but with a far different product mix.

Robust discussion about different scenarios can help management determine how best to navigate perceived obstacles. While the organization may decide to adopt one scenario as its plan of record, the act of exploring different scenarios can expose additional efforts to undertake:

- To mitigate the deleterious effect of a specific identified risk.
- To lay groundwork for a better path, should events unfold favorably.

After defining scenarios, evaluate the implications (cost, schedule, quality, reputation). Models can facilitate the detailed analysis. The best models will also

Conclusion

In these dynamic times, teams race to make daily decisions with serious financial implications. It’s tempting to run fast with gut-level, intuitive decisions. Our experience at End-to-End tells us the best decisions often defy intuition. They require a clear-headed, analytical view of the facts. We have called out resource allocation and demand forecasting for close attention. We also recommend scenario planning as an overarching practice for best applying them.

Firms struggling to come out the other side of this pandemic can optimize their outcomes by enlisting analytics as a valuable tool in that effort.

Case Study: Luxury Retail

Figure 1 - Global store closures

Stepwise store closures and reopening



The Challenge

A global fashion retailer closed its local stores over the course of weeks in response to local health concerns. Closures started in China and continued with the advance of the virus across Europe and the Americas. Sales plummeted. Ecommerce sales grew, but short of sales lost at brick and mortar stores. The company faces many challenges, from updating store assortments for the current season and balancing inventories, to managing a potentially permanent shift in ecommerce's role.

"Non-essential" retailers like this one face logistical hurdles with the stepwise reopening of stores as local threats pass. However, retailers must also contend with behavioral changes on the part of their retail consumers, such as lingering effects of social distancing behavior. Early indications with reopening markets in China suggest lower foot traffic in stores.

The Response

The retailer's forecasting team must provide an adequate forecast. Closed stores mean gaps in sales history that don't reflect true demand. At the same time, online sales increased beyond expected levels. Moreover, aggressive price and promotion plans continue to evolve. Machine learning techniques have been deployed to enable quick learning from local demand patterns as they evolve.

The firm faces a second analytical challenge. Normally, supply chains run with a largely static network. Over time stores or warehouses might be added or dropped, and transportation modes might change. Rarely, though, are stores or regional channels flipped on and off like light switches. The retailer's network planning team has ramped up its ability to evaluate alternative network configurations as projections for reopening change.