Eliminating deployment volatility and the associated high costs

Fluctuations in volume (volatility) have always been a part of all supply-chain networks. There is volatility not only in filling customer orders, but also in inventory deployment: the replenishment movements of product from plants or suppliers to market-facing distribution centers.

Like the weather, everybody talks about the evil of volatility in deployment lanes but nobody has done anything about it – until now. The following paragraphs outline the cost impacts and effective ways to mitigate them.

Deployment volatility generates excess cost

If only everything was calm and smooth – but it isn't. Instead, deployment volumes on any lane (origin-destination) varies greatly on a daily basis. This generates a significant number of bad outcomes:

- Best price/service carriers (preferred carriers) may not be able to handle the volume on any lane so the peak volume may need to be shifted to higher-cost, less-reliable truckers. This is illustrated in the following diagram:
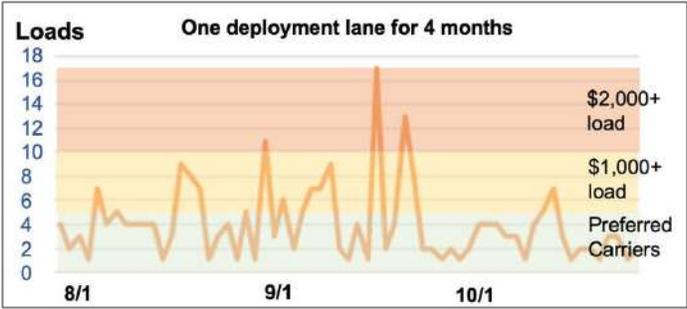
- Any location may become inundated with volume (or starved) as a number of uncoordinated ship points release loads that all arrive at once – more product than the site can handle. Equally important to managing lane volumes is constraining site throughput to match capacity. Loading or unloading a few extra trucks in a day may come at the expense of some overtime. Trying to load many additional shipments may drive a wider disruption and hurt customer OTIF (On Time in Full) . Similarly, when many shipments in excess of capacity are presented to be unloaded, product needed for a customer order may be still sitting in the yard and/or detention incurred – more pain for customer shipments

- While the dock is a constraint on throughput, the lack of storage space can also adversely impact unloading. Often this generates significant service failures as much-needed product waits in trailers

Supply-planning systems may actually exacerbate supply-chain volatility

Supply-planning systems typically react to customer needs unpredictability, creating much supply-chain volatility. The volatility in the number of deployment stock transfer orders (STO's) each day is a reaction of the planning system to customer variability. Because supply-planning

systems have limited capability to holistically consider transportation costs and vehicle availability over time, the supply signal tends to be problematic. Additionally, few supply-planning systems actively manage volume throughput of receiving or even shipping locations. The problem is complex because receiving volume is made up of shipments with varying transit times dependent on shipping location and mode. In summary, most planning systems don't manage volatility and throughput, and their reactions to customer variability may amplify volatility.

Ways deployment volatility can be mitigated or eliminated

There are multiple ways to impact volatility and its related costs:
1. Reduce the amount of spot freight by tendering earlier
2. Smooth freight volumes over time by pushing lower-priority deployment demand into a later date and pulling forward more needed requirements
3. Cut the pressure on both shipping and receiving sites by shifting limited capacity between lanes

Under all circumstances, there is a need to prioritize the product needed the most.

Reduce the amount of higher-cost freight by tendering earlier
Tendering deployment loads early (as many companies do) can create problems if it ties the tendering of trucks to the definition of what is on each load. The problem is that the further in advance you determine what is needed to be replenished, the less likely it is to be correct. But because carriers don't need to know what is on the load (for the most part), it's possible to reserve trucking capacity without specifying exactly what will go inside the trailer. Trailer contents can be defined later. Normally, "later" allows the planning system to get more accurate information about needs. This postponement strategy generates the following results:

- Increased lead-time for the carrier because they do still receive the tenders early

- Increased "first tender acceptance" – meaning the "most favored carrier" takes the load

- Better tailoring of actual STO's needed because the contents are specified as late as possible

Smooth freight volumes over time by pushing and pulling when deployment happens
Over the next 30, 60, or even 90 days, supply-planning systems typically project when product is needed based on target stock levels built on forecasts of customer demand along with variability factors for demand uncertainty and transit-time. If there is effective "trading-off" of risk and reward, bringing high-priority demand earlier or pushing items with ample stocks later does little to impact service. This strategy can effectively eliminate deployment peaks well before they are encountered.
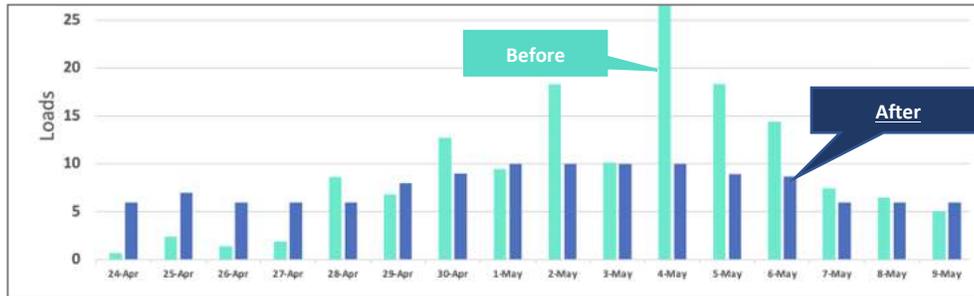
Cut site volatility by shifting limited capacity between lanes

As mentioned earlier, equally important to managing lane volumes is managing site throughput. Generally speaking, when making deployment decisions for any day, the requirements on any lane range from the high-priority, most-needed demand, to lower priority needs. And some deployment lanes will likely have many more high-priority replenishments required than others. To be clear, most companies would be willing to pay extra money, in the form of higher cost freight or overtime, to ensure customer-service needs are met. The preponderance of priority requirements can be used to favor volume on one lane over another on any given day, while setting the total site volume to within capability limits.

LevelLoad and AutoO$_2$ can eliminate volatility and high-cost freight

LevelLoad, a SaaS-based replenishment transportation scheduler has proven effective in smoothing deployment volatility. When combined with AutoO$_2$, an optimizing load builder, together, they can perform the needed smoothing and postponement.

Here is how it works

When the supply planning system runs, the latest requirements and other data are sent to LevelLoad which generates a ~30-day plan for shipments that is constrained by site and lane/carrier capacities. It does this by looking at the entire network of plants and distribution centers as well as:

- The priority of all deployment requirements

- Other shipments, etc. that are using site capability

- The physical characteristics of the individual items required

- Numbers of loads that can realistically be accepted by preferred carriers each day

Using fast-linear-programming techniques combined with an ultrafast AI-enabled (reinforcement learning) load builder that simulates the contents of future loads, LevelLoad iterates between the linear program and the load builder to identify what trucks need to be scheduled to move which products on which lanes. (See diagram) Even for large networks, it quickly settles on a plan and creates the needed signal for the TMS (Transportation Management System) to perform early tendering. This is often done in the middle of the night and can be completely autonomous.
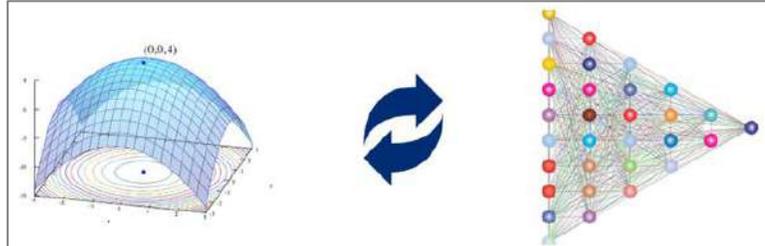
Closer to the shipment date, generally the day before the load is to be picked up, $AutoO_2$ (an optimizing load builder that considers many more factors than LevelLoad) takes the latest item requirements information from the supply-planning system and, for each of the tenders initiated by LevelLoad, determines what should actually ship on each vehicle. The whole process is outlined in the diagram on the following page:

Additionally:
- Because the carrier is known in advance, loads can be tailored to utilize available capacity rather than build to some "least common denominator."
- $AutoO_2$ shows the placement of each pallet and, if needed, each case. In this way, the person loading the truck can be assured that the load will be both legal and arrive damage-free.

LevelLoad and $AutoO_2$ deliver

The proof is always in the pudding. We can share results if you contact us.

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**To learn more about LevelLoad and AutoO$_2$
Contact Tom Moore (615) 791-0865**