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What's Next for Post-Pandemic Demand Planning?

Supply Chain Leaders' Guide To Harness Uncertainty and Minimize Stockouts

A trillion-dollar problem

With lean manufacturing and just-in-time delivery practices being the mantra of global supply chains, stockouts used to be viewed as an unfortunate yet inevitable side effect of otherwise efficient demand planning. Nonetheless, even prior to the pandemic and the great supply chain disruptions, the cost of stockouts to retail companies, according to research, was nearing $1 trillion in lost sales.1 Another pre-pandemic study suggests that an average retailer lost about 4% of revenue due to stockouts. For a billion-dollar retailer, that could mean $40 million a year in lost sales. [1]

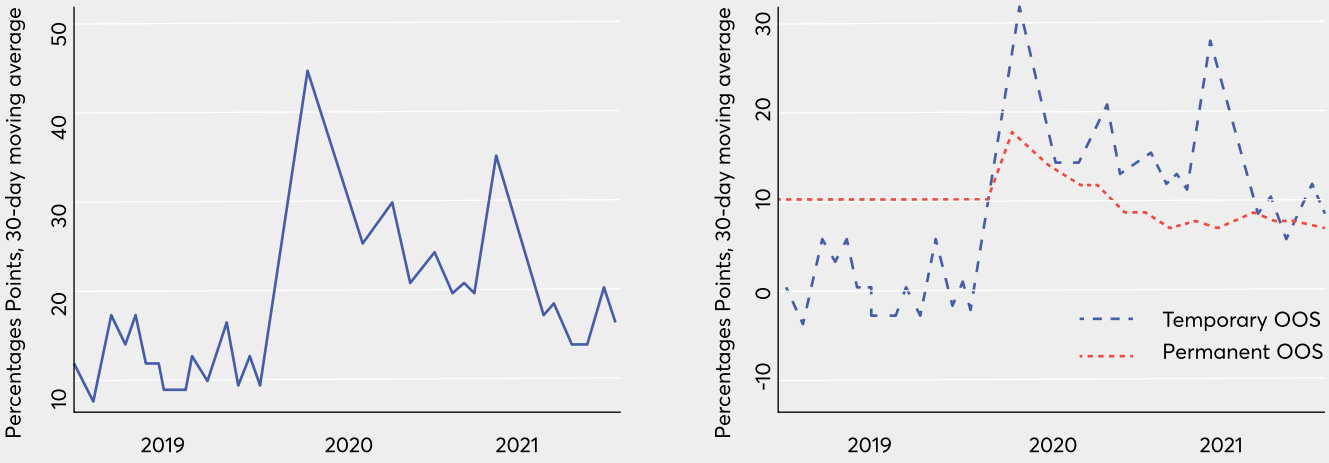
10% Stockout rates in 2019:

20% Stockout rates in 2022:

The same study explains that, depending on the product category, up to a quarter of consumers faced with a stockout will continue shopping but won't buy a substitute for their desired item at the store. Meanwhile, 21%–43% will even go to another store to buy the item.[2]

A missed one-time purchase, however, is only the tip of the iceberg. When evaluating the opportunity cost of stockouts, retailers must analyze the entire lifetime value of a customer that might churn after not finding an item they intended to buy.

Despite being flagged as an industry-wide issue, stockouts remained generally unresolved. Furthermore, COVID-19 and the related global lockdowns exacerbated the problem. Stockout rates jumped from roughly 10% in 2019 to 45% in May 2020, finally averaging out at 20% in early 2022.[3]



(a) All Stockouts

(b) Temporary and Permanent Stockouts

Figure 2: Stockouts in the United states, 2019-2021

The pandemic-related disruptions increased missed sales up to 7.4%, costing retailers $82 billion in 2021. In our example of a billion-dollar retailer, that meant In our example of a billion-dollar retailer, that meant an astonishing $74 million in lost revenue, not to mention an even greater customer dissatisfaction.[4]

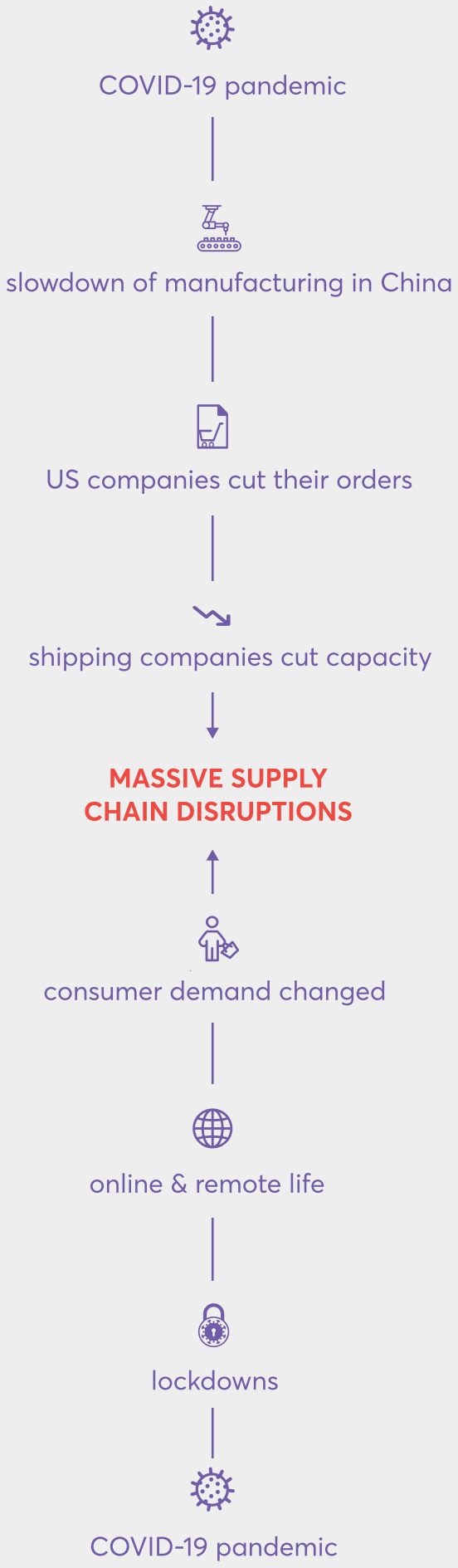
The ripple effects of the pandemic

Historically, three-quarters of stockouts were due to faulty in-store ordering and replenishing practices, under/over-ordering, inaccurate forecasts, and inventory management. Only the remaining quarter of stockouts could be attributed to replenishment and planning problems in the supply chain itself.[5]

In fact, the just-in-time economy was so dependent on the global supply chain that even the slightest discrepancies would have substantial ripple effects throughout the upstream and downstream processes. This sort of outcome is precisely what happened after the pandemic, with overall supply chain disruptions increasing by 14%.[6]

It began in China, the center of global manufacturing, where factories in Wuhan and many other cities were either isolated or shut down completely. The US companies that relied on Chinese manufacturers had to cut their orders. Shipping companies, in turn, cut capacity, expecting a drastic slowdown similar to the one during the global financial crisis more than a decade earlier. Ships were waylaid, and routes were canceled.[7]

This turned out to be a tremendous mistake. Suddenly, consumers wanted to stock up on essentials, turn their bedrooms into offices, and take advantage of the latest home entertainment options. They were also more inclined to order things online rather than go to a store and risk contracting the novel virus. Remote work, online gyms, and e-commerce quickly became the new norm, which, according to many experts, is here to stay. Consumer demand did not die; it transformed in response to a new reality.



Big data, useless data

The decreased availability of goods coupled with new consumer behavior patterns was a perfect recipe for disaster. The global shipping network became overwhelmed, which caused shipping prices to skyrocket. Just-in-time delivery was abandoned in favor of a "better safe than sorry" mindset, stretching the capacity of warehouses. Companies became overwhelmed by their own backlog of orders. In anticipation of holiday seasons, some businesses began ordering excessive quantities well in advance, further swamping the system.

Additionally, consumers were already accustomed to the benefits of the just-in-time economy, such as low prices and availability. Implementing incremental change in the shipping cost to customers or running out of stock would consequentially lead to potential brand damage. According to AdAge, 58% of consumers will stop buying from a brand entirely after as little as one to three supply chain delays or disruptions.[8]

So, now that it's clear that the big data collected before the pandemic is no longer useful, is there anything that supply chain leaders can do to minimize the negative impact of stockouts?

The vast majority of supply chain managers (67.4%) use Excel spreadsheets as their primary management and forecasting tool. Others use pre-pandemic tools that only work for historical big data.[9] With the average supply chain accuracy plunging to an all-time low, it's clear that neither of these older models is viable.

Demand planning leaders thus try to counter-balance faulty model forecasts with their expert intuition, resulting in stress over combined high personal accountability, high error probability, and low-risk tolerance from management and consumers.

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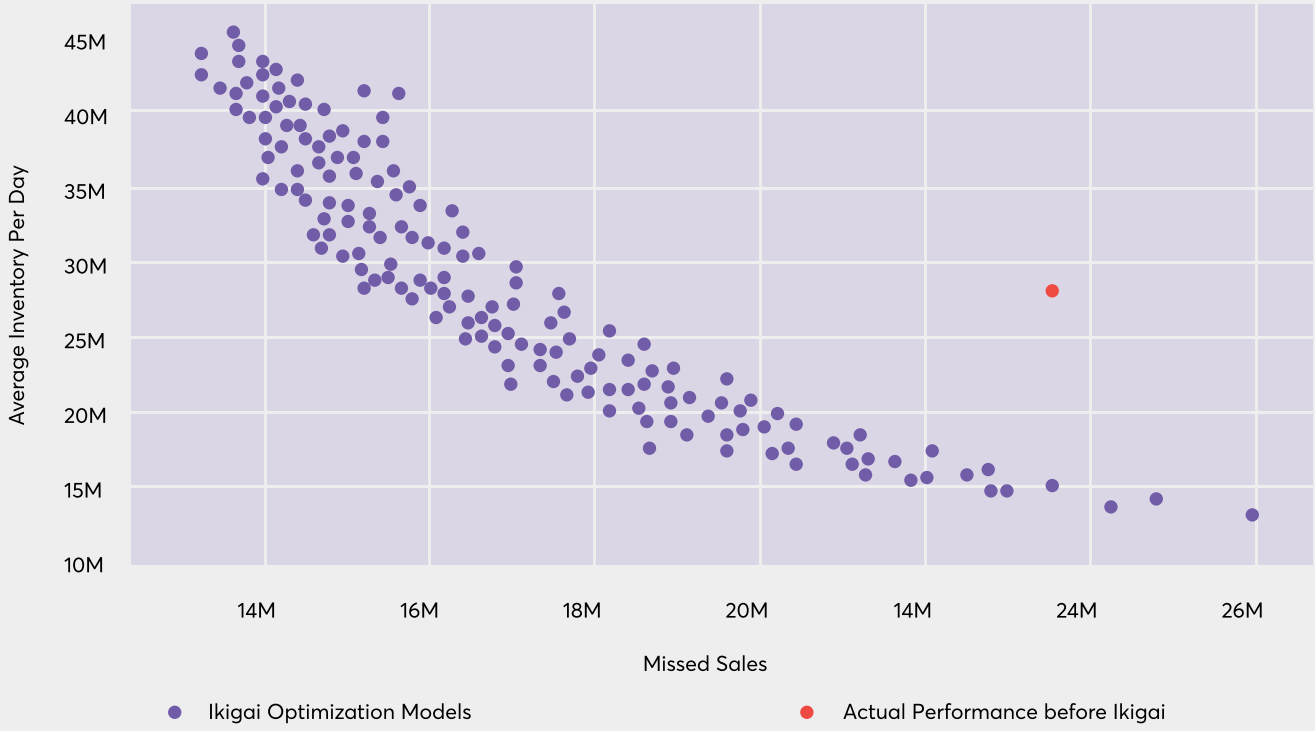
Ikigai offers a better way

If you are feeling the pressure and looking for a better alternative, Ikigai Intelligent Ordering and Demand Planning Solution might be just the tool for you. Ikigai's customers use their recent sales data to model the demand for each SKU, identify lost sales, and arrive at a purchase order decision-making algorithm to strike the optimal balance between being overstocked and understocked.

This algorithm can be customized. Based on specific use cases, it can be tweaked to account for particular constraints on individual SKUs, such as high cost per unit or larger physical size that would take up a disproportionate amount of space in the warehouse.

Ikigai Models of Purchase Order Decision Making



The plot above features missed sales on the x-axis and average inventory on the y-axis. Although it used eighteen months of actual sales and purchase order data to generate the dots, the model's secret sauce algorithms can work on as little as two or three weeks' worth of data.

The red dot represents the real intersection between the company's inventory level and missed revenue, while each blue dot represents a unique purchase order decision-making algorithm.

In other words, **the graphic provides the optimal trade-off curve between lost sales due to stockouts and the inventory carrying cost.**

In a perfect world, a company would be at the origin — $0 in lost sales and $0 in average inventory. However, this cannot be fully achieved due to supply chain complexities and volatility. Therefore, the company leverages Ikigai to identify the best possible trade-off between lost sales and the average cost of held inventory.

In this case study, the company had approximately $23.7M in missed sales and $27.4M of average inventory per day across eighteen months (the red dot). Instead, they could have selected the optimal algorithm for their use case by selecting a dot with a balance between lost sales and average inventory that best suited their strategy.

For example, it would be possible to hold the missed sales constant and minimize average inventory by approximately $13.6M. Meaning on any given day, the company would have, on average, $13.6M in extra cash on hand. Similarly, it would be possible to hold the average inventory constant and increase sales by approximately $8.1M. That is, the business would have increased sales by approximately 6.5%.

Hence, this method provides a trade-off curve that shows significant improvement over current state-of-the-art business practices. Visit ikigailabs.io to learn more.

[1] https://www.retaildive.com/news/out-of-stocks-could-be-costing-retailers-1t/526327/
[2] https://hbr.org/2004/05/stock-outs-cause-walkouts
[3] https://www.hbs.edu/ris/Publication%20Files/Cavallo_Kryvtsov_Stockouts_3_31_22_0112afc7-6b55-4e58-a0d3-f43e09799426.pdf
[4] https://www.foodmanufacturing.com/supply-chain/news/22043873/data-cgp-retailers-lost-out-on-74-in-sales-to-stockouts-in-2021
[5] https://hbr.org/2004/05/stock-outs-cause-walkouts
[6] https://www.zippia.com/advice/supply-chain-statistics/
[7] https://www.nytimes.com/2021/10/15/podcasts/the-daily/supply-chain.html
[8] https://adage.com/article/marketing-news-strategy/supply-chain-crisis-causes-demand-surge-resale-sites-and-marketplaces/2372826
[9] https://ikigailabs.medium.com/we-know-how-much-money-you-lost-in-sales-this-year-3d1b1157c94e