**Explanation to the left graph:**

Retail inventory-to-sales ratio, which looks at how much inventory is being carried in comparison with how much is being sold, reached an 18-year high in April—a clear outcome of COVID-19. The increase in e-commerce sales was not enough to make up for the store closures. In fact, it left many businesses heavily overstocked. As a result, this forced many to put inventory into storage or clear it at low prices that heavily impacted margins.

For instance, Macy’s Inc. wrote down about $300 million for the first quarter, flagging merchandise issues; Kohl’s cleared large volumes, cutting their gross margin from 38% in 2019 to 17% in 2020 for the three-month period ending May 2.

The fallout of overstock, combined with the ongoing uncertainty in customer traffic and buying behavior, has put retailers in a tough spot. Illustrating the point, Nordstrom Inc. recently told the [LA Times](https://www.latimes.com/business/story/2020-07-18/clothes-retail-sizes-colors-options-narrow-covid-19) that its stores were relatively bare of products soon after reopening because of a more “conservative approach” to stocking, to avoid being saddled with excess goods. Gap Inc. has also said it has tightened its inventory and is holding some items for next season.

**Explanation to Flow chart and right graph:**

Using an ML platform to predict future demand significantly improves forecasting accuracy compared to that of statistical-forecasting models. That’s because “hidden” patterns can be identified with large datasets. Moreover, based on new data feeds, ML algorithms will learn from shifting dynamics during the crisis and thus can better predict crisis-demand patterns than traditional models. During the initial learning period, manual overlays, such as human intervention, are needed to make sure the numerical results are making real-world sense.

**ML forecasting and covid overlays:** Can be explained from right graph

**Dynamic inventory management:** Replace simplified inventory-level calculations, such as minimum and maximum levels, with statistical safety stock using means and standard deviations to account for supply and demand uncertainty. This is a function of demand and supply variations, as well as targeted service levels. These can be differentiated by product clusters, customer groups, or crisis-related product requirements.

**Order book re-alignment:** Implement a procurement watchtower to review each purchase order and ensure a cost-optimal quantity is purchased. For example, it might be cost-effective to buy 1,000 parts at once, but negotiating with the supplier to deliver—and pay for—four batches of 250.

**Track and trace:** To ensure sustainable impact of the approach, it has to be continuously monitored using a comprehensive set of key performance indicators (KPIs), including forecast accuracy, number of canceled orders, inventory burn rate, and service level performance. In case of deviations, corrective actions can be implemented immediately.

References:

Right and bottom graph: <https://www.oliverwyman.com/our-expertise/insights/2020/may/advanced-forecasting-to-cash.html>

left: https://www.flexport.com/blog/rethinking-inventory-management-in-the-age-of-covid-19