



Disrupted Retail

How the Pandemic Exposed
Retail's Hidden Inventory Distortion



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Inventory Distortion WHAT IS IT?

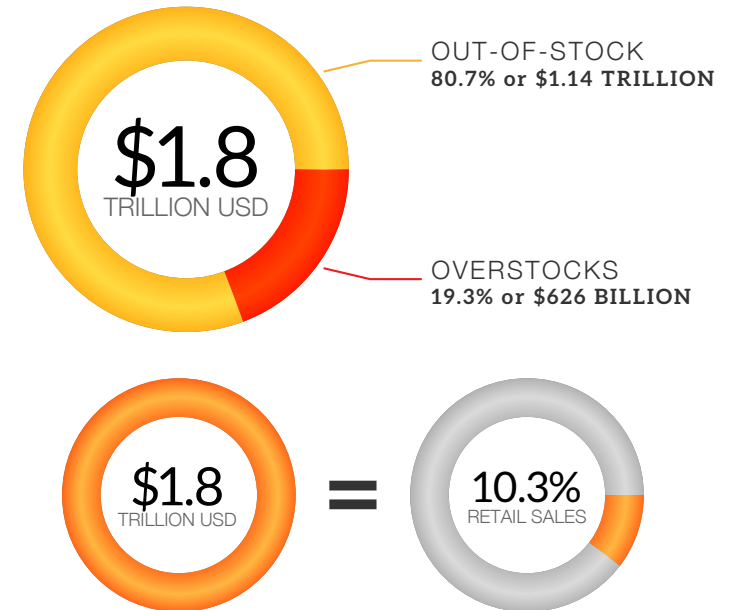
Since the beginning of time, retailers have struggled with having what the customer wants to buy in-stock when they want to buy it. Inventory distortion occurs when a retailer has too many of an item (overstocks) or too few of an item (out-of-stocks). In an overstock situation, the retailer must heavily discount the item in order to sell it, and in the out-of-stock situation the retailer risks losing the sale. As retailers have employed advanced forecasting and inventory systems, improvements have been made over the years. However, there remains a major disconnect between what retailers believe their inventory position is and what customers really experience when they come into stores.

IHL's research in this area grew out of a 2007 Wharton School of Business retailer case study. In that study, the retailer believed that they had a 92% in-stock position across all their items, based upon reporting from their IT systems. But subsequent interviews of customers showed that 1 in 4 were leaving the store without buying something they intended to buy for reasons other than the fact that the price was too high. According to the consumer, an out-of-stock and a lost sale are the same thing. And the reasons can include: empty shelves, not being able to get help they need, and the dreaded "the system says it is here, but I can't find it" statement from the associate. The customer doesn't care... for them, that item is out-of-stock.

On the other side of the inventory distortion equation is the overstock. All retailers have a certain planned discount for items, particularly those that are seasonal in nature. For our research, IHL starts with a 25% discount as simply part of the retailing game. What that means is that we do not truly count it as an overstock unless the item is discounted more than 25% off the list price. Thus, if it takes a 30% discount to sell the merchandise, we count only the difference (i.e. 30% - 25% = 5%) as the overstock cost. The combined cost of excess discounts of overstocks over 25% and the cost of out-of-stocks using the customer's definition make up our inventory distortion figures.

WORLDWIDE INVENTORY DISTORTION

Source: IHL Group



How big of a problem is inventory distortion for 2020 worldwide? Over \$1.8 trillion, or the equivalent of 10.3% of same store sales in retail and hospitality. **Or to put it another way, more than the annual GDP of Canada!** That represents a tremendous amount of inefficiency in the market that can be addressed with IT solutions.

Progress Has Been Made

To be fair, we are currently seeing extraordinary circumstances due to COVID-19 that have exacerbated the problem and hidden the fact that organized retail has made quite a bit of progress in reducing inventory distortion prior to COVID-19. In fact, prior to the pandemic disruption, the improvements made amounted to nearly \$158 billion worldwide since 2017. These improvements have been driven by improved processes, tighter relationships with suppliers, and several technology solutions that include computer-aided-ordering (CAO), more advanced forecasting with AI/ML, and more optimized and intelligent supply chains. Organized retailers in North America, Western Europe, Japan and Korea had the greatest improvement (17%) from 2017 levels. Indeed, these great gains were made by these retailers prior to the pandemic. Europe was especially strong in gains as more of the largest grocery/hypermarket chains adopted automated ordering solutions at a faster pace initially than in the US.

In emerging markets, the overall rise in retail sales, the growth of chains, and the vast opportunities provided to grow stores far outstripped the speed in which operations were optimized. Although

the largest retailers in these regions saw improvements, the overall retail growth due to the rising middle class in those regions pushed an increase in inventory distortion in the regions.

Further, it cannot be understated how much the likes of Amazon, Walmart, eBay, Rakuten, Alibaba, and other marketplaces have helped drive improvement in organized retail behaviors. Consumers quickly realized that marketplaces are rarely out-of-stock of what they wanted to buy but often their local retailer was. As a result, this forced many retailers to up their game and invest in recent years to overhaul their inventory accuracy, forecasting and purchasing solutions, leading to dramatic improvements.

So, things were improving dramatically around the world. But then COVID-19 happened.

Large retailers in North America, Western Europe, Japan, and Korea saw an average reduction of 17% in their costs of overstocks and out-of-stocks from 2017-2020 (before the pandemic). *Source: IHL Group*

INVENTORY DISTORTION
IMPROVEMENT
2017-2020 (PRIOR TO PANDEMIC)

 \$158b

Source: IHL Group

Pandemic Explosion

Every retailer had a plan in place for a natural disaster or social disturbance in their region. Earthquake plans, check. Riots, check. Hurricane, check. But no one had a plan for a global pandemic that completely shut down one side of retail and hospitality and drove panic buying on the other side. And if that wasn't enough, no one had a plan that accounted for a global shutdown that came on the heels of a two-month shutdown of the country that has been the supplier to the world.

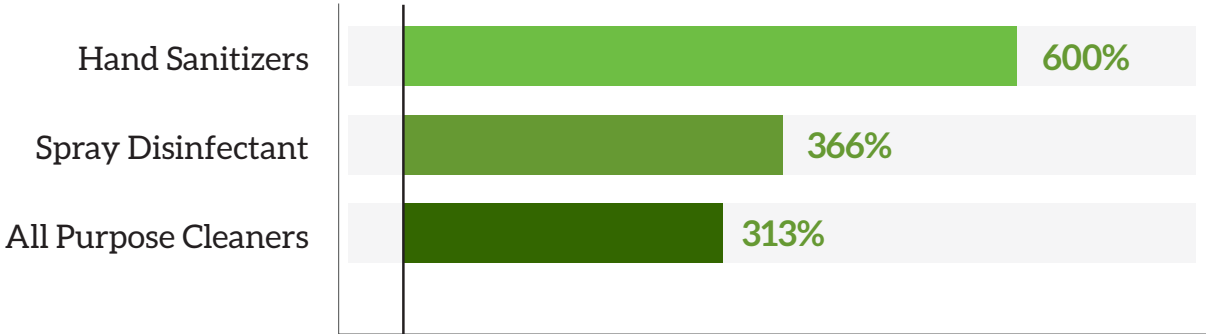
The end result has been that COVID-19 not only negated all the improvements made in the previous few years, it also blew open new areas of inventory distortion that had never been previously considered.

First, for those retailers deemed "essential" (most notably grocery, drug stores, warehouses, clubs/hypermarkets, and mass merchants), sales exploded due to panic buying. In some cases, sales increased over 600%, and the entire 4 months of supply in the supply chain was exhausted in two weeks as consumers raced for masks, cleaning wipes, toilet paper, puzzles, bikes, frozen pizza, and other items. Further, because of work-from-home mandates,

electronics and DIY retailers (both online and bricks-and-mortar) quickly ran out of items such as computers, monitors, webcams, and speaker phones. Since COVID-19 shut down China first, there was already a hole in the supply chain for many of these products. The demand was there, the shelves were simply empty.

Category Sales of Cleaners - March 2020

Source: IRI Proprietary Models



At the same time, clothing retailers were not deemed “essential”, and those retailers (especially those in malls), were forced to shut down, losing upwards of 90% of their spring season revenues. No one was buying that Easter or graduation dress. Proms, charity galas, and entertainment events were canceled as was much of travel. Specialty and department stores were subsequently loaded with merchandise that they could not sell until an all-clear was given, and even then those sales came with heavy discounting or were sold to third parties.

Finally, dine-in restaurants, theme parks, and other hospitality companies have had to completely refashion their business models. Some had a modest amount of inventory on hand that they had to discount or throw away. But for those that were able to pivot to more of a delivery experience, they often had to limit their menus to their most popular items, thereby reducing sales opportunities. Further, many of these companies could not meet the demand for delivery and pickup orders because their operations were simply not prepared to do so. All of these led to lost sales.

COVID-19 IMPACT ON INVENTORY DISTORTION

Source: IHL Group



\$570b

IHL estimates that retailers have experienced a \$570 billion loss in revenue that can be directly attributed to the surge and/or lockdowns of retailers and restaurants due to the pandemic.

Previously Hidden Categories of Inventory Distortion Exposed

While overstocks clearly increased in department and specialty stores (to the tune of about \$65 Billion), most of the pandemic-induced inventory distortion came from out-of-stocks due to surge buying behaviors. And while approximately 85% of the out-of-stock costs could be attributed to consumers walking into the store and finding empty shelves, a significant portion of newly discovered out-of-stocks were the result of new customer journeys that exposed out-of-stocks that would not be seen in the store.

For instance, when a customer walks through the store and finds that the store is out of their favorite brand of cereal, there are 30 other cereals to choose from. The customer rarely announces that to the store... they simply make another choice and move on. It is hidden to the retailer. There is no data tracking this loss, so the retailer never counts it in their figures. However, when Post Corn Flakes is specifically chosen in a customer journey for local delivery or click and collect, when it is out-of-stock, this creates an out-of-stock situation that is exposed and tracked.

Further, the out-of-stock forces the retailer to communicate with the customer to find out if the Kellogg's brand is ok as a

substitute. For the retailer, this not only slows the process and adds labor, but the retailer must also decide if they give the Kellogg's brand for the same price as the Post Corn Flakes (perhaps losing margin), charge the new price, or cancel the item and risk the customer going elsewhere. It also reflects poorly on the customer experience of using that shopping channel.

On average, pre-pandemic retailers were losing 5-8 points of margin if they had not optimized the labor and processes around click and collect or local delivery. Every substitution due to out-of-stock simply adds more labor expense to the transaction.

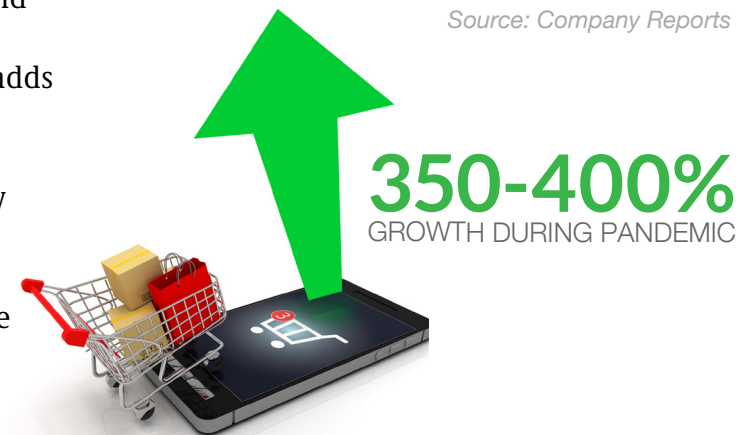
With click and collect and local delivery growing at rates of 350-400% for most grocery retailers during the pandemic, the impact of the out-of-stocks that were

exposed in online shopping in grocery, mass merchants, and drug stores are estimated to be as much as \$50 Billion USD worldwide.

Overall, IHL estimates that surge shopping and changes in customer journeys were directly responsible for exposing about \$505 Billion in previously hidden out-of-stocks.

GROCERY CLICK & COLLECT AND LOCAL DELIVERY SURGES

Source: Company Reports



\$505b in Out-of-Stocks

(CAUSED BY PANDEMIC)

85%

Known Causes

15%

Newly Exposed Out-of-Stocks
Due to Online Orders for Delivery
or Click and Collect

Source: IHL Group



Solutions

When we look at the tremendous costs of inventory distortion, we can't divorce ourselves from the short-term impacts of the pandemic, but there are solutions that not only helped retailers react more quickly to changes in demand but will also serve to help them advance in the future.

The first is computer-aided-ordering (CAO). Without question, systems can recognize trends in data and demand much faster than humans can. This was critical during the pandemic's initial stages. Those retailers who were able to more quickly adjust their orders up or down based on demand signals capitalized the most. This was especially true when demand indications were showing the need for multiple times increases over standard level orders. Those retailers who were using CAO capitalized on more of the sales than their competitors, getting much more of the supply for surge categories from the manufacturers than those retailers that waited.

Next is streaming data and IoT technologies (e.g. sensors, beacons, robots and video) for real-time inventory insight and accuracy. These technologies continue to improve and are critical to identify the true inventory in both the warehouse and store level.

Most retailer physical inventories are off by as much as 15-25% due to blind-spots and several types of shrink. Items can be miscounted, misrung, stolen, in the wrong locations, or vendors can fill shelves but not with the items matching the shelf plan. IoT technologies can help identify the real inventory levels, so orders are based on a much closer version of the truth (on-shelf, overhead or backroom), thus greatly improving inventory accuracy, fulfillment and customer experiences.

Fundamentally, it's all about data and insights. The last decade has been about integrating external 'big' data sources to improve demand forecast accuracy and help optimize inventory across the entire supply chain. Simply using internal transaction, price and promotion causal data is no longer good enough to achieve inventory optimization. To be able to incorporate weather, local events, social sentiment and yes, lessons learned from COVID-19 - even geo-political and CDC data



are now fundamental to improving business decisions (e.g. inventory optimization) directly impacting in-stocks and overstocks.

Many retailers have been experimenting with moving some of this data processing to the cloud to help reduce analytic workload costs, but the most common approach is likely to remain a hybrid balance of on-premise, edge and cloud computing. In periods of great surges in traffic and sales, onboarding personnel at the store level, and trying to keep shelves filled, the retailers that had cloud solutions could ramp up and were able to sort through the most relevant data and rapidly push it out to end users and consumers were best positioned to win.

The same was true for those companies that saw great drops in sales due to closures. Cloud solutions more easily enabled retailers to increase capacity for their ecommerce or delivery platforms and reduce the needs at the store level.

Cloud data platforms and point solutions also offer the opportunity to leverage key external data that assist in better forecasting of demand. Much of the previous gains before the COVID-19 impacts came from better forecasting and the

introduction of AI/ML into forecasting algorithms leveraging both internal and external data. Many retailers have benefitted greatly by applying these technologies to their internal data. When it comes to the impacts from COVID-19, the advantage for those retailers that could pull in external data gleaned insights from the outbreak in other regions and integrate those into their forecasts were at a significant advantage to those retailers who could only use internal historical data.

The pandemic and subsequent surge or decrease has opened the door to other technologies that may have been held back by strong unions or company culture in normal times. This applies to things like self-checkout and kiosks at the front-end operations. Specific to inventory management, examples of technologies seeing the greatest surge include smart shelves, electronic shelf labels, and upgraded forecasting and AI/ML tools. European retailers have long adopted electronic shelf labels, but adoption in North America has been somewhat muted. Due the pandemic, we have seen a surge in the use in several larger US retailers.

Grocers and mass merchants hired well over 1 million workers which provided consolation to unions and helped soothe union pushback. And then for others facing significant sales decreases, the pandemic simply forced changes that maybe were needed but not politically expedient before. Fighting for survival tends to crystallize decision making and eliminate bottlenecks that would hold things back in normal circumstances. This has certainly been true for technologies being deployed as a result of the pandemic.



What Retailers Have Learned

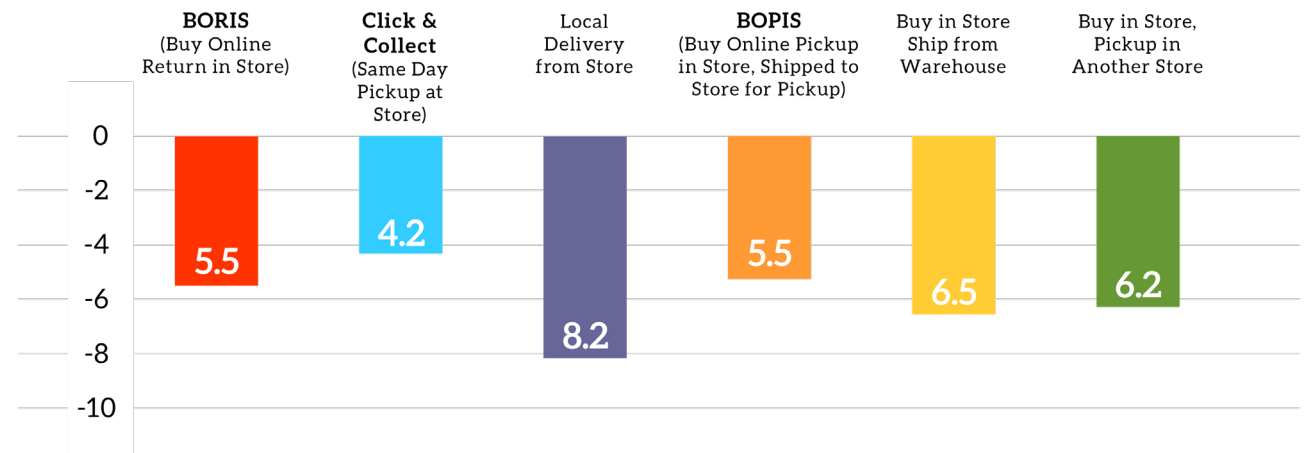
As retailers begin to digest the impacts of COVID-19, the simple fact that they have gone through the experience now provides the opportunity to learn from it and have an emergency plan the next time something like this happens. Understanding the mistakes as well as the wins will serve surviving retailers well.

The most significant learning that many retailers have had is to trust the data the systems are generating. During the peak periods, some computer-aided orders were in quantities 20-40x higher than normal based on the increasing demand. Some merchants trusted the orders and let them go through. These retailers maximized the sales they could get in those categories. Yet, even within the same retailer, when another merchant saw the increased orders, they were canceled because they didn't believe it was true. In this case they lost sales in that category. Leaning more on systems for identifying and reacting to trends and connecting those systems so that they can be revalidated with traffic and receipt data in real time will go a long way to helping in the future.

Once again, those retailers who can leverage sophisticated forecasting capabilities that allow for the inclusion of both internal and external data sources have a significant advantage. This is particularly true when applying AI/ML technologies to the data. One note of caution, however. The data coming in must be clean and plentiful for

the AI/ML forecast engines to use properly. As retailers move forward, expanding their boundaries on the type of data to use for forecasting will help improve overall performance and better react to other seismic events such as we have experienced with the COVID pandemic.

Average Margin Point Loss From Traditional Store Visit
WHEN CUSTOMER JOURNEY IS NOT OPTIMIZED



As mentioned previously, the pandemic also gave every retailer an approved mandate for change that helped break through corporate culture barriers. Every company has parts of their culture that value the status quo. When faced with the critical situation forced by the pandemic, those walls came down fast for the most successful retailers. Those who chose to pivot quickly were the ones to not only survive this period but are best positioned to gain share coming out of it.

Next is the importance of the optimization of customer journeys. During the crisis, retailers did whatever was necessary to meet customer demand. However, it became extremely clear that some processes were optimized, and others were not. They have the right systems and processes in place for some journeys, and are using smoke and mirrors for others. We fully expect that those retailers who lost significant margin from previously hidden out-of-stocks that were exposed will be investing in solutions around delivery and click and collect.

Finally, with the rise of these customer journeys, we fully expect that retailers will rethink their operations to support all the new customer journeys without negatively impacting the traditional ones. Generally, when 10% of business within a store goes to delivery or take out, this level becomes disruptive to the traditional walk-in business. Retailers and restaurants will continue to invest in dark stores/fulfillment centers and dark kitchens to help optimize the processes to maximize the process of all journeys.



The Next Battleground for Retail

As we mentioned at the beginning of the paper, great strides have been made in the last three years in reducing inventory distortion. Outside of the pandemic impacts, retailers improved their performance by \$158 Billion. Yet that still leaves over \$1 Trillion in costs in normal times that needs to be attacked.

At the same time, the pandemic has further increased the speed in which consumers are moving to customer journeys that have an online component, which favors marketplaces over single retailers. The retailers that win in the next decade will be the ones that are able to get accurate inventory counts using RFID and computer vision, and then are able to apply AI/ML to that data to support computer aided ordering.

It has never been more important for retailers to have in-stock what the consumer wants when they want to buy it. If stores don't have it, Amazon and other marketplaces can deliver it in less than a day. We firmly believe that the retailers that fix their inventory distortion issues in the minds of their consumers will not only do better but race ahead of all other retailers that have not made the investments.

THE NEXT BATTLEGROUND IN RETAIL

Source: IHL Group

