



A Comprehensive Guide
**To Retail
Out-of-Stock
Reduction**

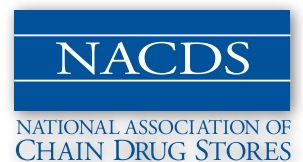
In the Fast-Moving
Consumer Goods Industry

P&G

A research study conducted by:

Thomas W. Gruen, Ph.D., University of Colorado at Colorado Springs, USA

And Dr. Daniel Corsten, IE Business School Madrid

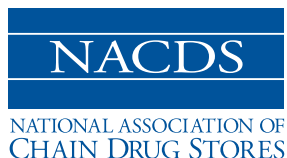


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Executive Summary

OVERVIEW

This research report provides a comprehensive examination of the foundational knowledge, measurement approaches, and strategies used to reduce retail out-of-stocks (OOS) in the fast-moving consumer goods (FMCG) industry. Its objective is to provide a guide to FMCG retailers that seek to reduce their costs associated with OOS items, while simultaneously enhancing shopper satisfaction with sustained lower levels of OOS. As outlined in Exhibit A, this research report:

1. defines retail OOS metrics to resolve the confusion surrounding previously reported “OOS rates” and shows the total costs of OOS, beyond lost sales (Chapter 1);
2. compares the three basic approaches to the measurement of OOS, illustrates how OOS measurement can be directly linked to root causes, and shows where most OOS sales losses occur (Chapter 2);
3. systematically examines seven causes of OOS, from forecasting to merchandising, showing the impact on overall OOS levels of addressing each (Chapter 3); and
4. provides a flexible approach to reduce OOS that retailers can easily adopt, can be effective even with low initial level of resource commitment and can scale with increased resource commitment (Chapter 4).

Our extensive research shows that retailers can sustain OOS reductions below the industry average of 8.3 percent. The core requirement is the development of an effective measurement system – one that is accessible, timely, inexpensive, reproducible, and generally undistorted. Without this core ability, it is impossible to determine progress, assign responsibility for tasks, and maintain accountability for results. When the measurement stops, people go back to their old way of operating, and the OOS return to their previous levels.

Out of Stock Definition is Clarified

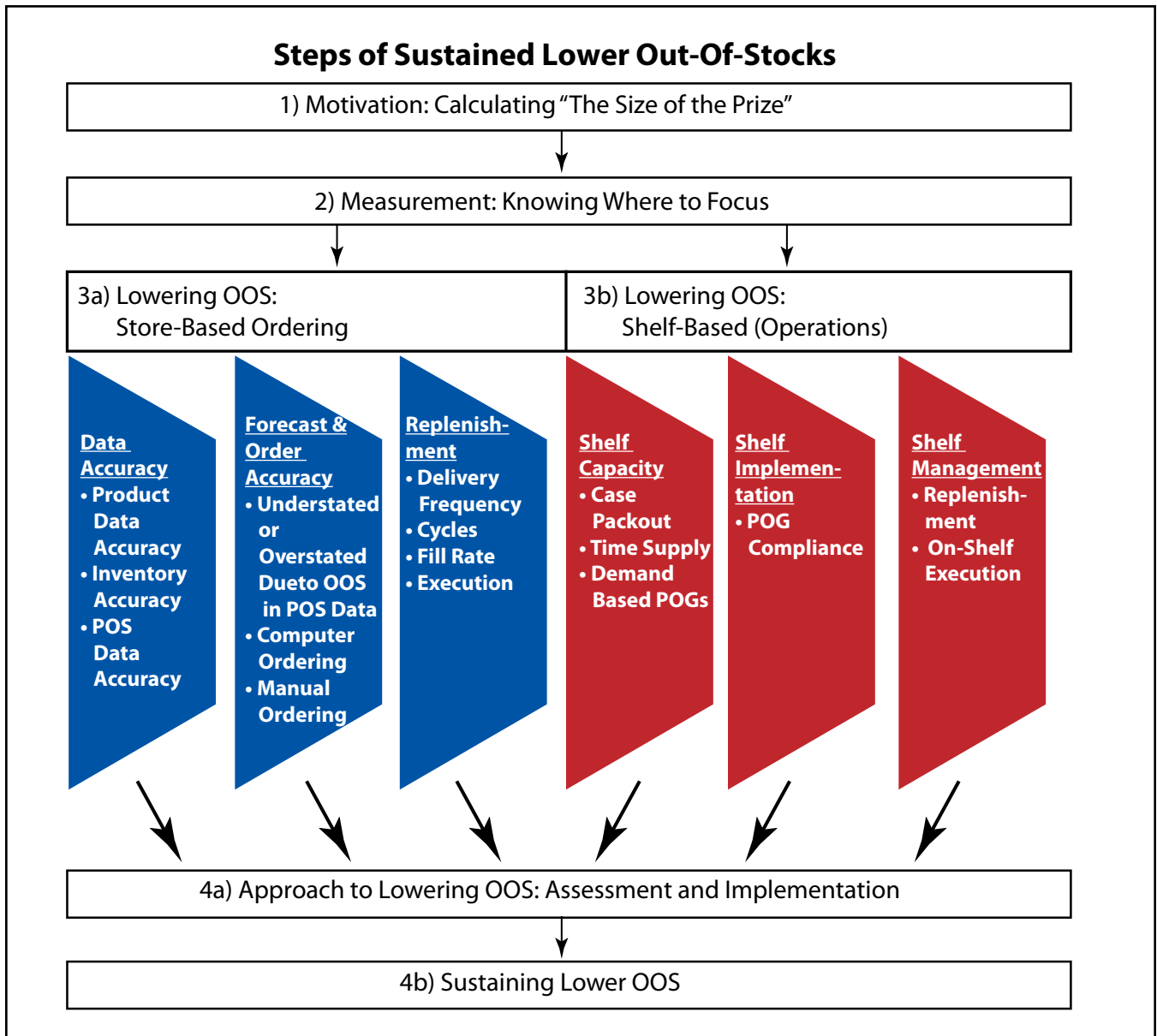
This report catalogs the meaning of various “out of stock rates” that have been reported in previous studies. We hope to avoid further confusion caused by vague reporting of the data collection and calculation methodology used to establish the rate. The three common types of measurement— (1) audit of physical inventory, (2) analysis of point of sale data (POS), and (3) use of perpetual inventory data (PI)—each measure different aspects of OOS, and thus report different OOS rates. Further ambiguity arises from differences in what is counted – (a) instances, (b) units sales losses, or (c) monetary sales losses. Generally, audits count *instances* observed at a point in time (when the audit took place). PI data is typically used to count *instances* over some time interval (perhaps a week). POS data analysis can yield a broader set of measurements including each of (a), (b), and (c) above.

We make a clear delineation between an OOS event (an instance of an item being unavailable for sale as intended), and the attributes of the OOS event, and statistical descriptions of collections of OOS events (expressed as an OOS rate). These attributes include: 1) number of occurrences over time, 2) number of simultaneous occurrences, 3) duration, 4) shelf availability, 5) lost unit sales, 6) lost monetary sales, and 7) number of customers impacted.

Store vs. Shelf OOS Perspective is Established

One of the keys to efficiently reducing OOS is a clear delineation between types and their distinct underlying causes. From the retailer perspective, the three main OOS types are the distribution center OOS, store OOS, and shelf OOS. While much of the industry is focused on distribution OOS, this report focuses on store and shelf OOS types.

Exhibit A: Overview of the Report



A store OOS occurs when the store is completely out of inventory. Excessive store OOS arise from mistakes in ordering, demand forecasting, or supply chain. Shelf OOS occur when there is inventory in the store, but the item is not on the shelf. The root causes of excessive shelf OOS are usually store processes, especially shelf space allocation, restock frequency, and ongoing monitoring of shelf stock for promoted items. Thus store and shelf OOS each have a different set of associated solutions. Understanding the difference and specifically addressing the root causes of each type will yield major reductions in overall OOS rates because most OOS events are at the retail shelf or the store. In other words, the distribution center could have supplied, or did supply the item – but there was a problem in retail store processes or execution.

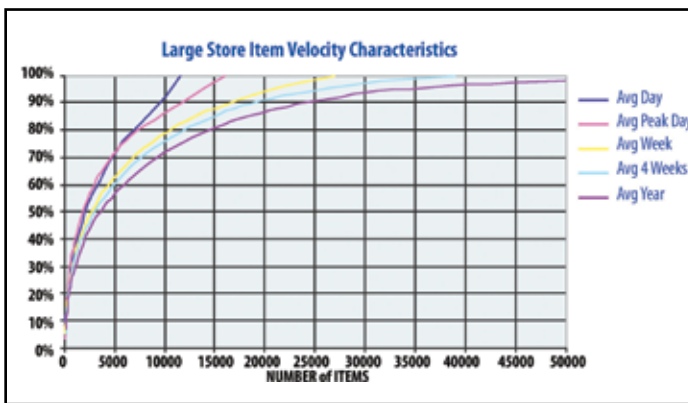
The Total Costs of Out-of-Stocks are Examined

The impact of OOS extends well beyond the lost sales of the OOS item alone. A variety of strategic and operational costs apply to both retailers and suppliers including decreases in store and brand equity and attenuated impact of promotions and trade promotion funds. OOS creates a ripple effect by distorting demand and leading to inaccurate forecasts. Retailer costs also include the time employees spend trying to satisfy shoppers who ask about a specific OOS item. For a typical U.S. grocery store, the cost amounts to \$800 per week. The corollary for shoppers is the amount of time spent waiting for resolution that could be spent more productively for the retailer in shopping—an estimated 20 percent of the average time for a shopping trip.

The Relationship of Volume on Out of Stock Rates

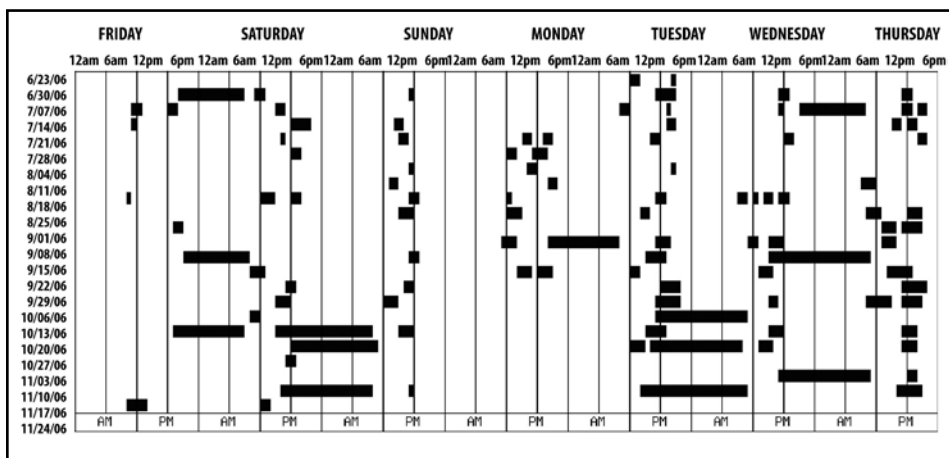
In this study we examine the relationship between sales velocity and OOS sales losses. Not surprisingly, fast moving items incur proportionally greater OOS sales losses, but the degree and concordant lost sales were surprising. As shown in Exhibit B, the classic 80/20 rule applies for item sales (20 percent of items comprise 80 percent of the total store sales in an average week). On the busiest day, 65 percent or more of the items did not sell at all, and on an average day, 75 percent or more of the items do not sell at all. Regarding

Exhibit B: Daily, Weekly, and Annual Item Unit Sales



Credit: Standard Analytics, 2006

Exhibit C: OOS Patterns Indicating Inadequate Replenishment Schedule



Credit: Standard Analytics

the relationship of the sales volume to out of stocks, the high demand items had almost six times the levels of lost sales from the out of stocks they encountered than did low demand items. These findings provide clear evidence that focusing on a relatively small number of SKUs can be an effective strategy to lower OOS sales losses.

Measurement Must Point to the Root Cause

Regardless of the measurement system used to track OOS— manual audit, POS data estimation, or perpetual inventory—it must be sustained, and it must point towards root causes. Due to their high expense and difficulty to scale, manual audits are usually not sustainable, and they do not provide a measure of sales loss. However, they can be effective when targeted at the most crucial products (either high velocity items or strategically important items such as “never outs” or preferred private brands), and when a second level of analysis is incorporated that links each OOS event to its likely root cause. A systematic means of assigning each identified OOS event to a set of pre-determined root causes can be implemented at a relatively low initial cost. However, it is costly to scale to a large number of items.

The use of point of sale (POS) data is a viable measurement method for many store formats. There are a number of companies that have developed algorithms to estimate OOS from POS data, and some retailers have developed their own in-house systems. POS measurement systems can be sustained, scaled and are able to deliver sales loss and duration measures. The accuracy of estimating OOS using POS data is 85 percent or greater, which is equivalent or greater to the accuracy of manual audits (where human error is present). One recent development of using POS

data calculation is the ability to discern visible patterns in out of stocks and thereby point directly at possible root causes and potential solutions—all done electronically. Exhibit C shows one of several patterns that have been identified as typical out of stock patterns. The pattern here shows that the OOS period occurs nearly the same week after week. Most likely, there are two deliveries a week, but four deliveries are needed. Alternative, the store could increase the safety-stock of this item. This approach shows enormous promise in reducing OOS due to its intuitive nature.

A third approach to measurement, perpetual inventory (PI) measurement systems can also be sustained, scaled and deliver sales loss and duration measures. However, PI systems suffer from the lack of on-hand accuracy necessary to make them consistently good measures. Algorithmic approaches to estimating and improving on hand inaccuracy

are being developed and implemented, and a best practice approach of manual techniques for improving PI accuracy is provided in this report.

Root Causes and Solutions

Moving from left to right across the trapezoids shown in Exhibit A, we researched seven key, different root causes and solution areas.

1. **Product Item Data Accuracy.** Product data inaccuracy creates an unstable foundation for ordering and forecasting. Commonly referred to as “data synch,” there are clear impacts on out of stocks when product data issues are excessive. The primary recommendation focuses on collaborative synchronization of data between suppliers and retailers using a third party vendor. We also show how the use of a parent-child product relationship system can enhance product data accuracy.
2. **Ordering and Inventory Accuracy.** We identified a variety of store issues that create PI system inaccuracy (especially on hands). The level of PI inaccuracy was stunning, as PI accuracy (where the PI exactly matched the on-hands) ranged from 32 percent to 45 percent in the four studies we conducted or examined. Exhibit D shows the distribution of PI accuracy for the best case we encountered. Phantom inventory (when PI system on-hand is greater than true physical product on-hand) is a major cause of OOS, particularly store OOS, because the reorder system does not recognize how low store inventory levels are. For the retailer shown in Exhibit D, items with correct on-hands had OOS event rates of 4.1 percent and had a rate of 8.9 percent where on-hands were not accurate.
3. **Demand Forecasting Accuracy.** Ideally a demand forecast should be the same as a sales forecast, however they invariably differ, largely because of the impact of sales variances caused by OOS. Whenever a shopper does not buy or shifts their buying pattern due to an OOS, it adjusts the demand history away from the sales history and no one can see the true demand history. Merging POS lost sales history with the sales history can more closely represent true demand and lead to better demand forecasts. When we further examined the impact of individual store managers adjusting merchandising quantities from suggested computer assisted ordering (CAO) quantities, we found that store personnel underperform even imperfect CAO demand forecasts.
4. **Store and Shelf Replenishment.** Using the POS measurements we were able to identify patterns that showed when store replenishment (from the distribution center or by DSD vendors) was too infrequent. We also found a positive relationship between backroom inventory and OOS, and thus recommend matching delivery schedules to meet the demand on the shelf, rather than maintaining backstock (except for promotional and other specific items).
5. **Shelf Space Allocation.** We found that 91 percent of the SKUs are allocated shelf space based on case pack size, and that 86 percent of the inventory on shelves is in excess of seven days supply. Given that the shelves are crowded, and that the fast moving items have six times the lost sales due to OOS than their slower moving counterparts, there is a strong case to be made to reallocate additional shelf space to the small number of faster moving items using demand-based planograms.
6. **Planogram Compliance.** We found that a 10 percent change in planogram compliance resulted in a 1 percent change in the level of OOS. Thus, categories that have high planogram compliance levels (90 percent or better), this would be a low priority. For retailers with low compliance levels, addressing planogram compliance can be a good way to lower OOS. The report also provides a best practice methodology for measuring planogram compliance.
7. **Item Management.** We examined the stocking practices that would affect manual ordering systems. We focused on three well-known links to OOS: 1) covering holes, 2) hiding product, and 3) shelf-tagging accuracy. In a new study we found that simple adherence to these practices had a huge effect on out of stocks, reducing OOS levels by about 40 percent, as shown in Exhibit E. While most retailers have policies for these practices, many were not enforced.

Exhibit D: Audited PI Accuracy of U.S. Retail Chain

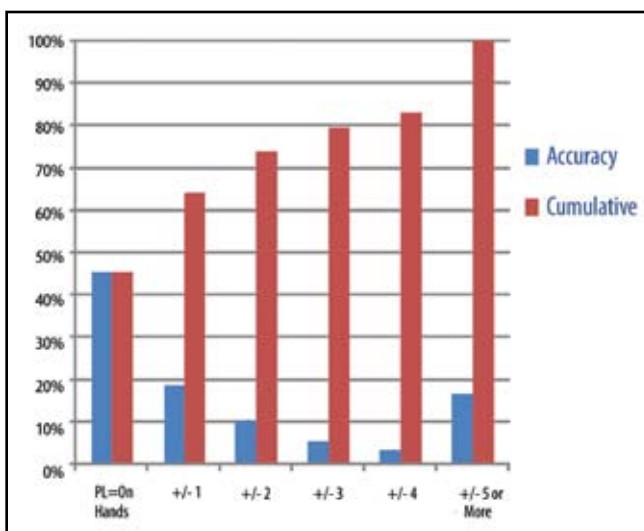
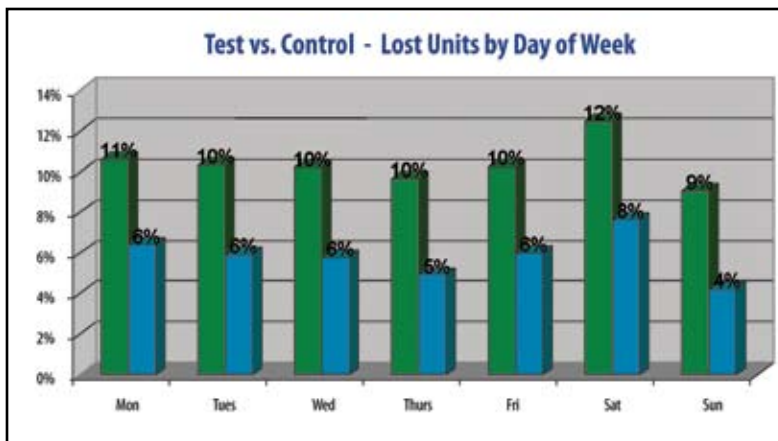


Exhibit E: Impact of Disciplined Shelf Management Practices on OOS Sales Losses

Credit: Data Ventures

RFID Technology and Shelf Out of Stocks

Due to technological and financial reasons, most radio frequency identification (RFID) applications have been limited to tags on pallets and cases and have not descended to the individual item level, where RFID shows great promise to address shelf OOS. However, at the case and pallet level, RFID applications can track when the cases are delivered to the store's backroom, and when they move from the backroom to the store floor and vice versa. As a result, RFID has been shown to reduce shelf OOS for high velocity items that require that the store hold large levels of backstock. RFID applications can enhance sorting of cases coming off a delivery truck. Items that are known OOS get identified quickly for immediate stocking, while items that are still available to the shopper but have room on the shelf for a full case get secondary attention. Cases that are backstock remain in the backroom, rather than being taken to the sales floor and returned. RFID requires disciplined shelf stocking practices. A case that cannot be completely stocked on the shelf becomes a problem when returned partially full because the RFID does not recognize a partial case in the backroom. In addition, RFID is being effectively applied to recognize shrink at the case level, where the impact of unrecognized shrink can have a large effect on OOS due to its large impact on inventory inaccuracy.

A Methodology to Get and Keep Low Levels of Out of Stocks

A simple three-step approach can be applied to address OOS. This approach is completely flexible based the amount of resources that can be devoted to addressing OOS and the desired amount of OOS reduction.

1. When assessing OOS, create both a product ranking and a store ranking, i.e., which products have the highest

level of lost sales due to OOS (or which items have been strategically identified on other criteria to have higher availability levels), and which stores have the highest level of lost sales due to OOS.

2. Define the targeted amount of OOS reduction desired, and then allocate the amount of gain to be achieved from product-based OOS reductions (store or ordering types of solutions) and from store-based OOS reductions (shelf or operations types of solutions). For example if a goal of \$500,000 lost sales reduction has been established, determine how much of the goal will be obtained from ordering type solutions such as PI data accuracy and how much should be gained from store type solutions (such as demand-based planograms). In this example, it may mean focusing on the top 300 products

and the worst 24 stores to get them to their target rate. The point of the recommendation is that this approach can be implemented by any retailer, and the degree of implementation can vary based on the available resources

3. Apply the identified solutions in the assessment specifically to those products (across all stores) and those stores (across all products). This will provide an estimate of the resource level needed to achieve the goal, and the degree to which adjustments can be made based upon the available resource. This targeting will keep work and disruption to a minimum. Once the solutions are implemented across these products and stores, a greater level of resources could be applied to additional products and stores.

There are a few important things to keep in mind with this methodology. First, both products and stores should be addressed, not exclusively one or the other. Working in one provides synergy to the other area, and increases the overall solution effectiveness. Second, some of the product gains will come in the targeted stores, thus are not fully additive in their impact. Finally ongoing and permanent measurement should be built into the process in order to sustain the gains in OOS reduction.

FINAL CONCLUSIONS

1. Out of stocks CAN be reduced on a sustained basis.
2. Measurement lays the foundation to be able to focus resources where losses are the most critical.
3. Selecting and maintaining a focus is crucial for success.
4. There are proven solutions for many identified root causes.
5. There is a simple, yet workable plan to achieve results.

