Science meets assortment optimization

Tune the mix to local demand
Assortment: a local journey
Retailers have traditionally been defined by the products they offer. One-stop shopping has been the theme of the present era, but the days of offering everything to every shopper seem numbered. In retail today, we observe a clear shift away from the era of mass merchandising and toward a more customer focused, targeted, assortment tuned to variations in local demand.

Today’s leading retailers define customer segments based on a deep understanding of their varying needs, behaviors and traits, and they develop distinct merchandising and marketing approaches for each segment.

There is a fundamental shift under way in how retailers view assortment optimization and what they are asking of their trade partners. Uniform approaches typically yield average results, but tuning the mix to local demand can yield superior performance. The surest way to reach your exact assortment destination? Local demand.

Past and present
Retailers’ approach to managing assortment has undergone an evolution. The shopkeepers of the past were mainly category specialists who offered deep assortment within a narrow sector. This business model is typified by the classic butcher shop, bakery, pharmacy and hardware store. Early multi-category retailers covered many more categories, but with limited variety. This approach is typified by the old-style general store.

More modern mass retailers, like supermarkets and discount chains, aim to provide a “super” variety that permits one-stop shopping – a depth of assortment across a wide range of categories. Manufacturers feed this tendency with an unrelenting stream of new product innovations aimed at satisfying diverse shopper interests.

Line extensions, new flavors and new product forms are an important source of vibrancy and “good news” within many Consumer Packaged Goods (CPG) categories. However, they also trigger other necessary assortment decisions – in a finite space, every addition creates the need for a deletion.

These intense competitive pressures to provide a comprehensive and appropriate variety have caused assortments to expand over time to where we are today.

Tug of war
Certainly, every large retailer wants to show its shoppers a selection that eliminates any reason to go to another store to meet their needs. But maximizing variety can lead to diminished returns, as space and inventory investment requirements increase faster than sales and profits.

Retailers must strike the right balance when considering the level of variety in each category versus others.
As a result, we contend with a continuous tug of war between desirable merchandise variety and store operating costs. The opposing "tug" centers on how to optimize space productivity. Store display space is finite. Retailers must strike the right balance when considering the level of variety in each category versus others. The tradeoffs can be hard to figure. So is the key question: “How much variety is enough?”

This tension is more than an internal operational concern for retailers. Over-large and frequently changing assortment can also add to consumer complexity and confusion at the shelf—not to mention disappointment when the wrong items are discontinued. When this impairs the shopper experience, trips and wallet-share may be lost.

IBM®, working with customers and strategic partners, has developed an approach to assortment planning based on four key themes or guiding principles:

1. **Optimization, not rationalization**
   It's SKU optimization, not rationalization. We focus developing the right assortment for each banner, category and store, not just a smaller assortment.

2. **Scientific and analytic approach**
   We use a fact-based, hypothesis driven approach supported by analysis of a large set of transactional data to evaluate opportunities to improve the assortment.

3. **Optimal assortments differ by segment**
   Localization of planogram planning delivers significant value. Leading retailers will define assortment clusters based on shopper preferences. With properly defined clusters, retailers can localize and optimize assortments to meet the needs of their high priority shopper segments.

4. **Retail and CPG collaboration is critical**
   Retailers and vendors will work collaboratively to develop assortment plans across various store types and sizes.

**Optimization not rationalization**

**Transferable and incremental demand**

Understanding the performance of a retail assortment is more complicated than merely summing the sale of its component SKUs. Wallets are finite, and when shoppers choose one item to buy they may also be deciding not to purchase an alternative item. Conversely, when they fail to find their first choice on the shelf, they may or may not select a second choice.

It is an emerging best practice among leading merchants to apply customer-centric measures of transferable and incremental demand in the assortment decision.

“Incremental” describes those items whose sales are measurably additive to the total category, and not readily substituted for another item.
“Transferable” describes items that shoppers find easy to substitute, with little net effect upon category sales. (Figure 1)

This is a meaningful advance over the “red line” or “rank-and-cut” process most retailers use to rationalize their assortment. The old way consists of ranking products by their rate of sales, identifying the slowest-selling items, and then delisting from the bottom.

Understanding transferable demand allows us to pursue a different and superior decision process for determining which items to delist or replace. Instead of the slowest sellers, cut the least incremental items.

Figure 2 is an example category of 50 items sorted in descending order of sales, as represented by the yellow columns.

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Figure 1: Transferable demand measures the incremental sales contribution of an item

[Bar chart showing incremental sales contribution]

Figure 2: Assortment optimization helps retailers understand incremental demand

[Bar chart showing sales and actual sales]
But the blue columns show the incremental sales contributions of those items. This example reveals that the 50th-selling item in the group is actually ranked number 13 in incremental sales. In this instance, eliminating the slowest selling item would cost the category a significant amount of lost sales, because shoppers are less likely to choose a substitute if it becomes unavailable.

A better choice would be to cut the lowest incremental sales item. In this case it would be our 32nd best seller because it appears shoppers readily shift their purchase choice to an alternative item.

Similar logic may be applied when merchants consider adding a product to a category. When considering the addition of another chocolate-flavored breakfast cereal to the assortment, the question is: how many sales will it add to the existing assortment?

The answer depends on what else is already present in the assortment and how incremental the new flavor is likely to be for existing shoppers. If some existing shoppers merely transfer their choice from another chocolate-flavored brand to the new brand, there is no net benefit to the category, while the shelf space is not available to offer a more incremental SKU.

Science and analytics

Applying science

As a core concept, each item's incrementality is based on the number of “like” choices available to the shopper. Where there are many like alternatives, incrementality tends to be less; where there are few like alternatives, incrementality tends to be greater.

To apply these concepts to deliver the best possible local assortment, we build three branches of science within an assortment optimization analytical model:

1. Consumer decision trees

Consumer decision trees are a widely used method that examines loyalty and/or panel data to understand how shoppers choose between items at the category, segment and sub-segment levels. (Figure 3)
Decision trees also help us understand which products are in a shopper's consideration set when he or she comes into the store. Product groupings may be determined using statistical cluster analysis. Common attributes may be identified as a basis of customer segmentation.

Many retailers already use decision trees routinely in their category planning activities. The assortment optimization analytical model can help to confirm or assess those as the process is initiated.

2. Incrementality curves
The second science, incrementality curves, creates representations of this for each SKU. They are developed by application of log-liner regression to calculate what happens as SKUs are added or removed within a sub-segment.

Combining these curves into a model allows us to study how consumers responded to past changes in the SKU count. We use these to predict how they will react to changes in SKU count going forward.

In Figure 4, the curve at the bottom shows a delisted SKU, selling 100 units per week until week 12. After delisting and sell-down of stock on hand, sales drop to zero for that item.

But the upper curve reveals that the total segment loses just 60 units per week, due to some switching or transference of demand to other items. (This analysis would work also in the opposite direction as SKUs are added.)

The analytical model tracks observations like this at many different points to develop incrementality curves.

*Figure 4: Demand transfers to other items in the sub-segment after delisting*
Creating these curves at the shopper segment level helps the retailer ensure that the assortment left on the store shelves is appropriate for the store strategy. This way we avoid removing items that are critical for core shopper segments.

3. Optimization
The third science element we apply is optimization. Put very simply, this consists of determining a desired outcome and letting the science built into the analytical model develop recommended steps to reach it.

Optimization goals may be set for incremental sales, profit, SKU counts, linear feet or other strategic objectives.

Changing the parameters within the assortment optimization analytical model allows us to pose almost unlimited “what if” questions and predict results:

- What assortment will appeal best to the “budget family” shopper segment?
- What assortment will drive maximum volume in my stores?
- I want to reduce the amount of shelf space allocated to this category. What is the right assortment for the smaller set?

These sciences – consumer demand, incrementality and transferability, and optimization – change the way we ask the question “What is the right assortment?”

The assortment optimization analytical model offers retailers the ability to quickly determine better assortment solutions. It works efficiently at the chainwide level, but it’s fast and flexible enough to support local variations by cluster, or even by store.

Taking it local
Optimizing assortment is based on sound consumer demand science. This applies to assortment in several specific ways:

- Increase category sales and profit with more effective and efficient assortment, prices and promotions
- Incorporate shopper insights to help ensure the proper assortment for your target customers
- Optimize assortment based on transferable demand and incrementality, not ranking reports
- Tailor the optimized assortment by store cluster and modular size with recommended facings
- Integrate optimized assortment into space management tools for store specific plan-o-grams

Segmentation and clustering
Shopper segments and local demand
For many retailers learning to cluster their stores based on shopper traits and behaviors, it may now be important to think about assortment at the shopper segment level.

We may choose to vary the merchandise assortment driven by an overall merchandising and marketing strategy that determines what customer segments we want to attract to our business.

The new thought process goes beyond how incremental an item is to the overall business. Now it focuses on specific shopper segments, by category and by store. This can get intricate, but assortment can’t get truly local without it.

For many retailers...it may now be important to think about assortment at the shopper segment level.
Collaboration
Inter and intra-company collaboration has finally proven effective for retailers and their trading partners. After decades of effort, technology and social concepts are making real collaboration possible across the retail business processes. This trend is also true for assortment planning. Category Captains bring deep expertise and unique perspectives. Retailers have a broader view. With deep analytics, common applications and easier communication, virtually everyone can contribute and benefit from assortment optimization.

Gone are the days when manufacturers could only hope that their new item introductions got the proper attention from the retailer. Gone too are the days when the retailer risked losing control and influence over his own business. Now merchandising teams can evaluate each item in each planogram – from the largest or most common set to the smallest or most unique. Manufacturers and retailers are working together to help ensure that the right items are on the shelves throughout the enterprise.

IBM DemandTec Assortment Optimization
IBM® DemandTec® Assortment Optimization is much more than just a software solution. It incorporates an overall retail planning process that links consumer demand, advanced statistical models and the expertise of the practitioner.

Assortments are designed to fit seamlessly within a larger ecosystem of shopper-centric retailing tools which are designed to help practitioners set the strategic objectives, constraints and requirements and determine optimized assortment, prices and promotions.
About IBM Enterprise Marketing Management

Designed to address the specific needs of particular marketing and merchandising users, the IBM EMM Suite is comprised of four individual solutions. Digital Marketing Optimization enables digital marketers to turn online prospects into repeat customers and loyal advocates. With Marketing Interaction Optimization, customer relationship marketing groups can engage each customer and prospect in a one-to-one dialog across communications channels. Price, Promotion and Product Mix Optimization allows merchandisers and sales planners to align price, promotions and product offers to increase customer loyalty and profit. And with Marketing Performance Optimization, marketing leaders, planners and decision-makers can improve overall marketing operations, and in particular the planning process, to reduce costs and increase results to maximize marketing ROI.

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