Management and Effects of In-Store Promotional Displays

1 Motivation

There has been considerable research in the OM literature on the topic of assortment planning (i.e., which products to offer?) and to a lesser extent on shelf-space allocation (i.e., how much space to devote to each product?). However, little attention has been paid to the problem of where to place products in the store. This latter problem is both important and complex, as the placement of products in the store is a lever by which the retailer can impact customer traffic patterns and thereby shape demand across products.

We examine an important special case of the product location problem, namely the choice of product to feature in a promotional display. Examples of promotional displays include endcap displays in supermarkets and beverage displays near cashier stations in convenience stores. While there is work in the marketing literature seeking to understand customer behavior in stores and to measure the impact of product placement decisions, price and advertising promotions, we are not aware of existing research providing prescriptive insights for the complex decision of which product to feature in a promotional display.

A display provides a visibility advantage to the featured product over products stocked only in the regular shelf space. We can decompose the impact on demand for products in the category into two effects: (1) the display expands the overall category demand by capturing the attention of some customers who would not otherwise have purchased from the category (the “demand expansion effect”) and (2) it may induce some customers to substitute the promoted product for their original preference (the “substitution effect”). We model both effects. We note that both effects can be present in the more traditional assortment planning problem, but the promotional display decision gives the retailer an additional degree of freedom. That is, it allows the manager to modulate the category’s visibility and to shape substitution patterns even given a fixed assortment. Furthermore, it can be changed more easily and therefore made more dynamically than the assortment decision.
2 Setup

We model the retailer’s management of a single product category and we assume that the set of products in the category assortment is exogenously determined, as are the profit margins and mean utility (or popularity) of each product. (We intentionally take assortment and pricing decisions as given so that we can focus specifically on the effect of the display.) All products in the category are co-located in a native “aisle” location, and at most one product is selected also to be featured in the promotional display.

We employ the nested multinomial logit (NMNL) framework to model customer choice, which we interpret as a two-stage choice process. The customer first encounters the promotional display (if present) and chooses whether to purchase the featured product, visit the aisle, or leave without purchasing from the category. A customer who visits the aisle may choose among the full assortment of products or may choose not to purchase. We assume that a customer who visits the aisle incurs a constant disutility representing the transit cost. The retailer collects the profit margin associated with any purchased product plus a bonus margin from any customer who visits the aisle. This bonus margin captures the expected margin of any impulse buys or complementary products the customer encounters upon visiting the aisle.

To model the demand expansion effect, we consider a baseline market size, and a percentage increase in the market size when the category is promoted. We can interpret it as representing a set of “aware” customers whose knowledge of the category is not swayed by the promotional display, plus profits from a set of “impressionable” customers who consider purchasing from the category only if a promotional display is present.

3 Analysis and Findings

We break down the overall promotional display decision into two subproblems. We first characterize the retailer’s optimal choice of product to promote from a given category, and
then we examine the value of the promotional display across categories.

When we consider the optimal choice of product to display from a given category, we show that the retailer can immediately eliminate some products from consideration based only on margin and popularity characteristics. The remaining products form an “efficient set” within which higher popularity implies lower margin and vice versa. Intuitively, featuring a popular product in the display minimizes the chances of customers leaving empty-handed, while keeping popular, low margin products in the aisle maximizes both margins at the display and accessory spending in the aisle. We prove that the latter strategy is optimal when an aisle visit is highly inherently attractive to customers, and we show this is the case when the aisle assortment is relatively large, when customers are heterogeneous in their preferences, and when the transit cost is low. An example implication is that popular products are good choices for endcap displays in large store footprints where customers incur high transit costs to visit an aisle. Moreover, high margin products, though at a potential popularity disadvantage, work better in a display when the category demand is spread out across multiple products in a large assortment.

When we analyze the value of the promotional display across categories, a key factor is the strength of the demand expansion effect for a category. We assume that the degree to which the promotional display can increase potential demand differs across categories, as some categories have an impulsive nature while others are more utilitarian. Clearly, the value of the promotional display is greatest when the demand expansion effect is strongest. Moreover, when the demand expansion effect is strong, the value of the display increases in the attractiveness of the aisle (determined by the assortment size, customer heterogeneity, and transit cost); the opposite is true when the demand expansion effect is weak. This implies that the display should be reserved for two classes of product categories: those with high demand expansion upside and an attractive aisle option, and those with stable category-level demand but a less appealing aisle option.