

Freshness Management in the Retail Business

Hisashi Kurata

University of Tsukuba, Japan

Seong-Hyun Nam

University of North Dakota, USA

INTRODUCTION

In a shopping occasion, customers expect something more than just buying products they want. They expect shopping to be a good experience. Hence, a big challenge for retail business is to keep store attractiveness in an intensively competitive market. For example, emerging apparel firms, such as Zara, H&M, and Forever21, keep on introducing new products in a short span but do not reorder the same items once stock out occurs to attract customers' attention. Another example of such efforts is the excellent assortment planning system, which always introduces new and eye-catching products to sustain store freshness, contributing in the success of Seven-Eleven Japan, Co., Ltd., the largest convenience store chain in Japan (Matsuo & Ogawa, 2007). Here, the role of new products is to raise the sales of the top sellers by attracting customer awareness to the subcategory as well as to give a fresh impression of both the category and the store. In a sense, such new products are not expected to earn profit by themselves but to increase a storewide profit by increasing customer traffic and attention.

At first glance, our discussion might be considered similar to existing work on store assortment and traffic building. For example, category management sets its goal as increasing store traffic and/or raising profits generated by purchases of the items in the store (Dhar, Hoch, & Kumar, 2001). Also, it is common to use a loss leader strategy: A highly discounted price, even lower than its

wholesale price, is set not to gain profitability but to increase customer traffic (Hess & Gerstner, 1987). However, our research actually differs in several aspects. First, we clearly separated items that generate profit for a retailer from items that generate freshness for an attractive store image. Category management research often categorizes items with respect to penetration and frequency (e.g., Fader & Lodish, 1990; Dhar, Hoch, & Kumar, 2001). However, our categorization is based on the retailer's purpose in displaying the item on its shelf. Because our focus is on the assortment of attractive new products that give a store a fresh image, we call this research issue "freshness management." Second, we took into account the trajectory of the optimal shelf-assortment plan over time. We explored the dynamic behavior of the shelf-space decision for a traffic builder. Third, our model analytically provides the optimal assortment policy in business, while majority of the papers on category and assortment management are empirical based on sales data. In fact, we applied to store freshness management an idea of a simple optimal control model that was used in the machine maintenance model.

In this chapter, we propose freshness management, which determines the most adequate shelf assortment and new product development for retail business to keep an adequate level of store attractiveness to customers, to maximize customer traffic, and to maintain competitiveness and an advantage over rivals. In particular, the goal of this chapter is twofold: First, we present a conceptual

framework of freshness management. The other objective is to formulate analytical models that can assist in the research on freshness management. One unique point of our model formulation is to apply optimal control approaches to freshness management. Historically, optimal control theory has been applied to inventory management, repair/maintenance, advertising/pricing (Thompson & Sethi, 2005; Kamien & Schwartz, 1991), and marketing communication mix optimization problem (Raman et al., 2012). However, using optimal control theory to analyze a retailer's attractiveness and corresponding traffic control is new.

The remainder of the chapter is organized as follows. Background section reviews existing research on store attractiveness and optimal control application. Model section presents a base model. Several extensions of the base model are developed in extension of the model. Finally, concluding remarks concludes the chapter.

BACKGROUND

Assortment

Store assortment has been studied from various perspectives. Mantrala et al. (2009) claimed that the number of categories, the number of stock-keeping units (SKUs) within a category, and the number of individual items of a particular SKU are to be balanced in a product assortment planning. Broniarczyk et al. (1998) empirically researched how consumers' perception of store assortment is recognized and what cues influence their perception of assortment reduction. They said that the availability of a favorite item and shelf space influence customers' perception of SKU reduction and show that business can reduce the number of SKUs without customers noticing such item reduction. Cachon, Terwiesch, and Xu (2005) investigated retail assortment planning, including consumer search, customer search in other stores after assessing the utility of assortment

in a certain store. They concluded that without customer search, a retailer's assortment plan tends to be narrower than the optimal level, especially when a limited variety is available in the market.

Traffic Building and Store Attractiveness

One of the common traffic builders for retail business is the loss leader strategy to increase customer traffic. Hess and Gerstner (1987) analytically addressed a loss leader item from the marketing point of view. A loss leader item is a regular product with an intensive price discount, while a traffic builder in our research is the product that is uniquely designed to raise customer attention. Numerous attempts have been made so far to study stocking issues on perishable items. Namias (1982) and Goyal and Giri (2001) reviewed perishable inventory management research. A recent work by Bai and Kendall (2008) models shelf-space allocation and inventory decisions for fresh items. Their model assumes that items with utility decay generate profits, while our model expects a traffic builder not to generate profit but to increase store traffic and customer attention.

MODEL

The principal modeling idea of this paper is borrowed from the preventive maintenance model offered by Thompson (1968). In contrast, in our model, a retailer displays new products on the shelves as an attractiveness builder to keep customers' perception of a store's attractiveness and freshness, which could lead to earning profits and gaining competency over time. Hence, we set a managerial effort to produce new attractive products as a control variable to model our question of how a retailer should create a fresh image/impression of the store to make it competitive in the market. Table 1 shows our interpretation of the notation.

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