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In a collaborative study with a major Dutch retailer, the authors assess the short- and long-term effects of a 25% item reduction on category sales. On an aggregate level, a major assortment reduction can lead to substantive short-term category sales losses but only a weak negative long-term category sales effect. Short-term category sales losses are caused mainly by fewer category purchases by former buyers of delisted detergent items. However, the results also show that the assortment reduction attracts new category buyers. These new buyers partially offset the sales losses among former buyers of the delisted items. The collection of supplemental process data on assortment perceptions and actual search time in the test stores before and after the assortment reduction provides evidence that delisting results in an increase in perceived search efficiency and a decrease in actual search time.

The Short- and Long-Term Impact of an Assortment Reduction on Category Sales

Since the early 1990s, increased competition from “category killers,” such as Wal-Mart and Aldi, has forced traditional grocery retailers to implement cost-saving programs (Basuray, Mantrala, and Walters 2001; Dhar, Hoch, and Kumar 2001). A common way to save costs has been to reduce the number of offered items. Some assortment reduction projects use a “cutting-the-tail” strategy, in which low-selling items in a category are eliminated (see, e.g., Boatwright and Nunes 2001; Drèze, Hoch, and Purk 1994; Food Marketing Institute 1993). Such assortment reduction projects can be regarded as natural experiments to assess the impact of assortment cuts. However, the results of these experiments are mixed.

In Table 1, we provide a schematic overview of prior literature on assortment reductions, in which we classify existing studies according to two dimensions: (1) the type of experimental method (laboratory versus natural experiment) and (2) the dependent variables chosen (assortment perceptions versus purchase behavior/category sales). Laboratory experiments tend to focus on perceptions (e.g., Oppe-

wal and Koелеmeijer 2005), though some studies have considered both assortment perceptions and stated purchase behavior (e.g., Broniarzyck, Hoyer, and McAlister 1998). Perceptions that have been studied include perceived assortment variety and assortment satisfaction or evaluation. In contrast, natural experiments focus only on category or store sales.

Neither the current laboratory experiments nor the natural experiments distinguish between the short- and the long-term effects of assortment reductions. However, this essential distinction can provide valuable insights into the effectiveness of marketing tactics (Dekimpe and Hanssens 1995; Dekimpe et al. 2005). Moreover, ignoring the short- and long-term effects of assortment reductions may lead to the wrong conclusions. For example, if the long-term effect is less negative than the short-term effect, the retailer may overstate the negative consequences of an assortment reduction, which would lead to an overly restrictive policy on assortment reductions and, in turn, to inefficient assortments. Therefore, it becomes essential to study both the short- and the long-term effects of assortment reductions.

In this article, we use a natural experiment to measure the effect of an assortment reduction in a single category (detergents) on category sales. We extend current assortment reduction studies that employ assortment sales as the dependent variable by distinguishing between the short- and long-term effects of assortment reductions. Furthermore, we add to this literature stream by analyzing the entrance of new buyers. Our research questions in this collaborative study can be summarized as follows: (1) What are the short- and long-term effects of a major assortment reduction on total category sales? (2) Do these short- and long-term

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Table 1
OVERVIEW OF PRIOR STUDIES ON ASSORTMENT
REDUCTIONS

	<i>Assortment Perceptions</i>	<i>Purchase Behavior/Category Sales</i>
Laboratory experiment, hypothetical reductions	Broniarczyk, Hoyer, and McAlister (1998); Oppewal and Koelmeijer (2005); Van Herpen and Pieters (2002)	Broniarczyk, Hoyer, and McAlister (1998)
Natural experiment, real reductions	Broniarczyk, Hoyer, and McAlister (1998)	Boatwright and Nunes (2001); Borle et al. (2005); De Clerck et al. (2002); Drèze, Hoch, and Purk (1994); Food Marketing Institute (1993); Zhang and Krishna (2005)
	The current article: Supplemental process data, with inclusion of actual search time	The current article: Main study with addition of short- and long-term impact and entrance of new buyers

effects on category sales differ between former buyers and former nonbuyers of delisted items? and (3) Does assortment reduction affect the sales percentage accounted for by new category buyers?

The last research question has particularly important implications for the empirical literature on sales effects of assortment reductions. Several studies have already shown sales effects (e.g., Boatwright and Nunes 2001; Borle et al. 2005; Zhang and Krishna 2005) without explicitly considering short- and long-term effects. However, there are no studies that have considered empirically whether an assortment reduction attracts new category buyers. We aim to investigate this specific issue with a combination of new-buyer analysis and supplemental in-store process data.

We conduct our study in close cooperation with a major Dutch retailer. We use customer loyalty-card data from more than 25,000 households in two test stores and two control stores to assess the short-term and long-term category sales effects of an assortment reduction (we define category sales in monetary units). To provide insights into the explanations of the found sales effects, we collected supplemental process data on changes in assortment perceptions (i.e., assortment variety, search efficiency, and assortment satisfaction) and actual search time due to the assortment reduction.

We structure the remainder of this article as follows: In the following section, we discuss the collaborative research project that underlies this study in more detail. Next, we discuss the theory, methodology, and results. We then discuss findings of the supplemental process data. This is followed by a discussion of our results and managerial implications, in which we focus specifically on the implications for our collaborative research partner. We conclude with research limitations and resulting issues for further research.

COLLABORATIVE ASSORTMENT REDUCTION PROJECT

A team consisting of a retailer, a brand manufacturer, and academics carried out this assortment reduction project. The retailer aimed to save costs in the supply chain and reduce complexity by lowering the number of items in various categories, particularly those defined as “routine categories” (Dhar, Hoch, and Kumar 2001). Primarily, the retailer’s objective was to lower its total number of store items by approximately 1500, which would enable it to close a warehouse. The associated cost savings were estimated to be approximately €4.5 million per year. However, the retailer feared that such an assortment reduction might affect its category sales. Therefore, we conducted a pilot project in one category to investigate the impact of a major assortment reduction.

In this article, we focus on the results of this pilot project, which considers an assortment reduction in the detergent category. The retailer used to offer 150 detergent items in its assortment. Despite this large number of items, this category performed below its fair share compared with a price-aggressive competitor that carried only approximately 80 items in its detergent assortment. Thus, the retailer decided to remove 37 items of the total 150 items. The removed items constituted 25% of the total number of category items and 14% of the category sales. Thus, in general, low-selling items were removed. A 25% reduction in items is a smaller reduction than that which Boatwright and Nunes (2001) study, but it is a larger reduction than the one that Drèze, Hoch, and Purk (1994) report. For each delisted item, the assortment manager verified that there was at least one reasonable alternative item within the remaining assortment. The 37 delisted items included brand delistings (all items of one brand are delisted) and item delistings (e.g., a delisting of a package format or variety within a brand).¹ Overall, the assortment reduction resulted in the delisting of six complete brands, corresponding with 17 different items. All the delisted brands were low-equity brands. For the other 20 delisted items, consumers could still switch within the brand. The selection of items that were delisted in the test stores was based on item turnover statistics and a consumer decision tree analysis that the manufacturer provided. First, items that did not meet regular turnover demands were selected for reduction. Second, the consumer decision tree analysis showed which detergent segments had potential overlap among items. The retailer’s category manager made the final decision about which items should be delisted. In the case of clear “me-too” items, the category manager preferred to delist the item with the lowest gross margin.

Category space was held constant by giving the remaining items more shelf space and keeping the overall structure (e.g., location of items on the shelf) of the presented assortment constant. In general, this resulted in more facings for remaining items. Furthermore, no new items were introduced during the test. Sales data before and after the assortment reduction were collected from two test stores and two control stores. The perception data were collected in the

¹In the remainder of this article, we do not distinguish between brand and item delistings. Therefore, when we refer to item delistings, we imply both brand and item delistings. The only exception is the analysis reported in n. 4, in which we explicitly consider differential sales effects between brand and item delistings.

two test stores before and after the assortment reduction occurred. On the basis of the outcomes of this project, the retailer decided whether the assortment reduction would be rolled out nationwide and, if necessary, which adaptations it needed to make.

THEORETICAL BACKGROUND

Sales Effects of Assortment Reductions

Several studies have considered the category sales effects of assortment reductions. For example, Drèze, Hoch, and Purk (1994) study the effect of a 10% item reduction in eight categories and report positive sales effects. However, these positive effects may be due to other changes to the assortment presentation in their study. Using six categories, the Food Marketing Institute (1993) reports both negative and positive sales effects of assortment reductions. The recommended level of cuts led to a sales increase of 2%, and more extreme cuts led to a small reduction in category sales. Boatwright and Nunes (2001, 2004) report an average neutral sales effect of reductions for a weak-performing online grocery store, though they also find negative sales effects for categories with the deepest assortment cuts. On average, 56% of the items were reduced. Borle and colleagues (2005) use household panel data of the same online grocer that Boatwright and Nunes (2001, 2004) study and conclude that overall store sales are reduced and that less frequently purchased categories are more adversely affected by assortment reductions. Moreover, practical experience shows the negative effects of assortment reductions. For example, in 2001, the leading Dutch grocery retailer, Albert Heijn, deleted almost 1500 items across categories, which caused widespread consumer complaints (*Foodmagazine* 2002).

Negative sales effects may occur because after the assortment reduction, a percentage of buyers will no longer be able to find their preferred item (Broniarczyk, Hoyer, and McAlister 1998). These buyers may initially postpone their purchase but may eventually decide to switch items or switch stores (Campo, Gijsbrechts, and Nisol 2000, 2004; Sloot, Verhoef, and Franses 2005). If the customer switches to another item, no category sales losses will occur. However, if the customer decides to switch stores, category sales will decrease for the retailer.

Conversely, assortment reductions may also have positive sales effects. Previously, the general belief was that more assortment is always better (Oppewal and Koelemeijer 2005). Recently, however, it has been claimed that the opposite may be true (Broniarczyk and Hoyer 2005). Several studies in consumer research and psychology have shown negative effects of too large assortments and positive effects of small assortments (e.g., Gourville and Soman 2005; Iyengar and Lepper 2000). Negative effects associated with large assortment size may occur because of an excessive search complexity (Botti and Iyengar 2004). This may cause customers not to buy products in a category with too large of an assortment; that is, they cancel their purchase (Huffman and Kahn 1998). Reducing assortment size would decrease search complexity, which might induce nonbuyers in this category to start buying products.² As a

result, positive sales effects might occur. This might explain why Drèze, Hoch, and Purk (1994) and Boatwright and Nunes (2001) find either positive sales effects or no sales effects. In the case of no sales effects, positive sales effects due to the entrance of new buyers might offset negative sales effects among former buyers. However, no studies have explicitly considered the issue of the attraction of new category buyers. We believe that this is a notable limitation of current studies. Studying this issue is important because (1) it may explain why no negative sales effects are found, and (2) it might provide an empirical validation of experimental studies in psychology and consumer research that show the benefits of a small assortment. Thus, we explicitly consider the entrance of new category buyers in our empirical analysis. To gain even more insight into the possible attraction of new buyers, we also investigate assortment perceptions, such as search efficiency and assortment variety, before and after the assortment reduction. Furthermore, we study actual search time as a measure of search efficiency.

To summarize the foregoing discussion, there is ample empirical and theoretical evidence for a negative sales effect of an assortment reduction, especially among former buyers of delisted items. However, this negative sales effect might be (partially) offset by the attraction of new buyers. In turn, this attraction may compensate the initial negative effect in the long run. The latter sales effect has not been empirically investigated.

Short- Versus Long-Term Effects

Numerous studies in marketing science have considered the short- and long-term sales effects of marketing-mix variables, such as advertising, promotions, pricing, and new product introductions (Bijmolt, Van Heerde, and Pieters 2005; Dekimpe and Hanssens 1995; Nijs et al. 2001; Pauwels, Hanssens, and Siddarth 2002; Pauwels et al. 2004). However, the literature on assortment reductions contains no studies that distinguish between short- and long-term effects.

The available evidence indicates that the short- and long-term effects of marketing-mix instruments may differ. For example, Nijs and colleagues (2001) demonstrate a short-term effect of price promotion that dissipates in the long run. According to Hanssens, Parsons, and Schultz (2001), most effects of marketing actions dissipate over time. The question is whether these findings hold for assortment reductions as well. Note that an assortment reduction is fundamentally different from the previously studied promotions. The assortment reduction is a one-time permanent change, whereas promotions occur regularly and are temporary events. Therefore, long-term effects of an assortment reduction are more likely to be present.

To understand the short- and long-term effects of assortment reductions further, we first focus on the reactions of former buyers of delisted items because we expect that negative sales effects will occur mainly for them (Broniarczyk, Hoyer, and McAlister 1998). As we noted previously, negative sales effects among these former buyers manifest

²In the remainder of this article, we refer to new buyers to the category as "new category buyers." This group may consist of several types of cus-

tomers, such as new-to-the-store customers, infrequent category buyers, and buyers who used to buy the category products at other stores.