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Does shelf space management intervention have an effect on calorie turnover at supermarkets?

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ABSTRACT

Despite recognizing the potential of retail settings for interventions aimed at bringing the rate of obesity down, there have been few attempts to implement experimental studies aiming to increase consumption of healthy foods and decrease consumption of unhealthy foods in the retail setting. An experimental controlled trial has been conducted using 10 supermarkets in Denmark. The study looked specifically into the possible effect of shelf space management intervention at supermarkets. The study found a significant intervention effect for individual products targeted by the project. But overall, care is needed to interpret results on aggregate level since statistical findings do not support category wide effect of shelf space intervention.

1. Introduction

The rate of obesity has more than doubled globally since 1980 (WHO, 2015). Obesity arises due to imbalance between calories consumed and calories expended. The food environment is receiving increasing attention from researchers and governments as an important factor affecting calorie consumption (Story et al., 2008). Food stores constitute an important component in the food environment. Moreover, studies estimate that between 20% and 60% of a typical shopping basket is made up of unplanned purchases (Bell et al., 2009; Underhill, 1999), where consumer decisions are partly influenced by in-store atmospherics (Nordfält, 2011), and where retailers therefore can have great influence on what shoppers purchase and hence how many calories they buy.

Shelf space optimization is a marketing strategy that takes advantage of consumer impulsiveness. Food location inside the store is related to food accessibility and availability. It has been shown that some shelf locations are more easily accessible to consumers than others (De Pelsmacker et al., 2007), and past literature has shown that easy access to high calorie foods increases their consumption (Chandon and Wansink, 2012; Kessler, 2009). Some research in shelf space optimization's potentials for store profitability has been conducted (Bultez and Naert, 1988; Corstjens and Doyle, 1981, 1983; van Nierop et al., 2008), but to the authors' knowledge the potential role of this tool for health promotion has not been investigated quantitatively. As the challenges of obesity and overweight become increasingly pressing, retailers face increasing scrutiny about what they stock on the store shelves (Haigh and Durham, 2012; Politiken, 2014) and are increasingly urged to consider public health in their shelf allocation decisions.

However, more knowledge in this field is called for (Grewal et al., 2009). The objective of this paper is, therefore, to investigate the sales effect of a shelf space management intervention (SSMI) that moves products with relatively lower calorie density to better accessible shelf locations, and products with higher energy density to less visible shelf locations. Two types of effect can be distinguished: location effect[1] (certain shelf locations are thought to be better than others in terms of sales (De Pelsmacker et al., 2007)) and preference effect (consumers may have preferences for some products regardless of where they are located), where the latter could arise due to price, taste, convenience, or habits associated with the product (Christian and Rashad, 2009; Drewnowski, 2007; Finkelstein et al., 2005). We focus on the location effect in this paper - more specifically how changes in shelf space locations allocated to healthy (defined as low-calorie) and unhealthy (high-

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calorie) foods affect their sales (Ma et al., 2013). Furthermore, in line with past findings (Curhan, 1973), we hypothesize that shelf space has higher impact for impulse products than for staples.

2. Literature on consumer behavior and nudging through shelf space management

Shelf space management, defined as careful placement of products on shelves and organization of categories within each store to generate greater sales, is an important strategy for retail managers (Bezawada et al., 2009), and shelf space productivity is used as a metric to benchmark the performance of stores. Indeed, for retailers, shelf space is one of the biggest investments and a source of bargaining power (Varley and Rafiq, 2004). Other things being equal, it is generally agreed that products located at eye level generate the best sales (De Pelsmacker et al., 2007). Therefore, high-margin products are usually put on the most visible shelves, while low-margin products are placed on the floor rack (Van Der Ster and Van Wissen, 1987).

A number of studies have investigated the importance of location (Chandon et al., 2009; Chevalier, 1975; Chung et al., 2007; Cox, 1964, 1970; Curhan, 1972; Desmet and Renaudin, 1998; Dreze et al., 1994; Farley et al., 2009; Frank and Massy, 1970; Kotzan and Evanson, 1969; Krueckenberg, 1969; Schmit et al., 2004; Sigurdsson et al., 2009; Wilkinson et al., 1982), using different designs and methods. The identified studies are mainly based on experimental field studies, econometric (observational) studies or optimization studies, or combinations of these, most often with a focus on retailers' profit maximization objective. Some of the identified papers predominantly implement field experiments at stores (Chevalier, 1975; Cox, 1970; Curhan, 1972; Frank and Massy, 1970; Kotzan and Evanson, 1969; Krueckenberg, 1969; Wilkinson et al., 1982), some analyze experimental data with econometric methods to identify causality (Chung et al., 2007; Desmet and Renaudin, 1998; Dreze et al., 1994; Schmit et al., 2004), and some develop optimization models using advanced heuristics (Borin and Farris, 1995; Borin et al., 1994; Bultez and Naert, 1988; Corstjens and Doyle, 1981, 1983, 1985; Murray et al., 2010; Yang, 2001; Yang and Chen, 1999).

In a manipulation experiment, Wilkinson et al. (1982) found a significant increase in sales both when space size was increased (ranging from 19% to 39%) and when the product was displayed in two locations (ranging between 77% and 243%), while a study by Dreze et al. (1994) found some location effect, although limited, on sales.

Positioning brands on top and near the center of the shelf improves attention and evaluation (Chandon et al., 2009). Sigurdsson et al. (2009) examined the effects of a search cost in the form of a product position within shelf space and found higher percentage of purchases of potato chips placed on the middle shelf compared to the lowest or highest shelf. Thus, having realized such differences, retailers may exploit products' competition for the best shelf space and introduce slotting allowances (Sullivan, 1997).

The majority of the studies in the marketing literature focused on effects of shelf space management on product margin. Only two experimental studies that investigated the effects of product placement on consumption of healthy products were found (Sigurdsson et al., 2011, 2014). Sigurdsson et al. (2011) performed a repeated-measures in-store experiment supplemented with customer surveys. The experiment manipulated the location of bananas. They found that although an in-store survey indicated customers' positive attitude towards fruit and vegetable consumption, results from the experiment was inconsistent with this as consumers' stated intentions deviated from actual buying behavior. A sequel study (Sigurdsson et al., 2014) not only investigated the effect of SSMI on the sale of healthy products (fruit, fish) but also looked at performance of unhealthy products (confectionary) under the SSMI. They reported increase in sales of fruit and fish and a concurrent decline in confectionary (Sigurdsson et al., 2014). Despite strengths including objective sales data and customer survey at the experimental stores and diverse stores (supermarket and convenience stores) this study however had some limitations, as there was no control group to account for possible confounding problem, and no information of the possibility of substitution with similar products could be revealed from the data due to a limited number of products included the study. In our paper we look at both individual products that were affected by the space management policy and the overall category sales. In addition, we have information on which products that were on offer at discount prices, and controlling for these and other variables helps us get more reliable results.

3. Study design and data collection

This study focuses on dairy products in Danish supermarkets. The dairy category represents a major share of Danish consumers' total calorie consumption, and it has many different subcategories and products, both in terms of healthfulness and caloric density. Although the final aim is to investigate the effect of SSMI on total calorie sales, it is also important to explore how individual subcategories perform relative to each other. Differentiating between product subcategories is important because consumers have different perceptions about the healthiness of different products (Moorman et al., 2004).

Thanks to a volunteering supermarket chain in Denmark, a SSMI was conducted in five stores, which were selected as to represent different geographical locations in Denmark. Five other stores from the same chain with similar geographic locations were selected as control stores.

To facilitate implementation of experiment and subsequent analysis, a color-coded planogram was used. According to this planogram, all dairy products were categorized as either "red" (high energy density products), "green" (low energy density products), and "yellow" (medium energy density products). With the aim to promote products with relatively lower caloric content by making them easily accessible on shelves, the "green" products were placed in favorable shelf space (middle and eye-level shelf areas), while "red" products were allocated to less favorable parts of the shelf in the intervention. The yellow-coded products received a shelf space corresponding to their intermediate status. The intervention was undertaken in 2013 (specifically week 37–47, excluding a one week gap, week 42). The study period was in total 10 weeks, 5 weeks of baseline period without intervention, and 5 weeks intervention period.

A member of the research team helped implement the stocking as per the study plan with the assistance of trained store employees. To ensure the integrity of the experiment, the research staff member paid visits to follow up on product placements within the intervention stores, and took photographs for documentation in both the baseline and intervention period (Fig. 1, showing the movement of some of the selected "red" products).

Other factors affecting sales such as promotions, discounts, quality, and quantity related factors could have taken place at the same time as the intervention and may have given rise to substitution or complementarity effects. But as these (chain-level) factors were the same for both the intervention and control stores, such factors are not considered a serious problem for the analysis. Besides, some of these factors are controlled for when estimating the intervention effect.

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