Two Essays on Product Management at the Dynamic Interface between Manufacturers and Retailers

Wanyu Li

Desautels Faculty of Management
McGill University, Montreal

June 2024

A thesis submitted to McGill University in partial fulfillment of the requirements of the degree of Doctor of Philosophy

Table of Contents

List of Tables

List of Figures

ABSTRACT

Product management is undeniably the foundation of most marketing activities. While manufacturers make significant investments in product development, the availability of their items to consumers depends on retailers' actions. Yet, most of the existing literature on product management tends to focus exclusively on manufacturers or retailers, disregarding the essential interconnectedness of the decisions made by both parties. The aim of this dissertation is to examine the dynamic interaction between manufacturers and retailers in terms of their product decisions and measure the extent of these effects through empirical research.

We present two studies that examine the effects of retailers' product decisions on manufacturers' performance and the efficacy of manufacturers' strategies. Essay 1 examines the impact of product removal, a frequently employed strategy in the highly competitive retail industry, on manufacturers' sales. In particular, we compare the strategies for product removal used by retailers and manufacturers, and we show that product delisting, a retailer's initiative, negatively impacts manufacturers' sales. In contrast, product elimination, a manufacturer's initiative, has no effect on sales. To protect market position in response to product delisting, brands may raise within-product similarity while decreasing across-product similarity so that consumers are more inclined to choose a substitute within the brand.

The second essay investigates the influence of retailers in modulating the efficacy of a manufacturer's product design, specifically focusing on the instance of nutritional claims. Our findings indicate that the efficacy of nutrition claims diminishes when retailers increase the number of products featuring such claims. Retailers can indirectly influence manufacturers' strategies' effectiveness by impacting competitive dynamics through product and brand assortment. This essay enhances the existing body of knowledge on product management by

emphasizing the importance of retailers' indirect influence on the success of product design. In order to create appealing new products or effectively manage an existing product portfolio, managers must thoroughly evaluate the present retail landscape.

The two essays significantly contribute to the existing body of literature on manufacturer-retailer interaction and product management. The findings from both studies emphasize the impact of retailers' marketing and assortment selections on the effectiveness of manufacturers' product strategies, which is a relatively unexplored aspect of the interactions between manufacturers and retailers compared to other marketing strategies such as pricing and promotion. Manufacturers strive to develop and manage their product lineup, but the final choice of what to buy is ultimately influenced by the range of choices offered at the retail store. Hence, the marketing efforts conducted within physical retail establishments and the rivalry between brands significantly impact consumer choices and manufacturers' overall success. Second, a lack of focus exists on product removal under manufacturer-retailer dynamics in the product management literature. The first essay enhances the existing body of knowledge by focusing on the repercussions of product removal on manufacturers and offering managerial recommendations on how to alleviate them. Third, the role of retailers in changing the intensity of competition among manufacturers has been neglected in studying the effects of product strategies on sales. The second essay addresses the gap by examining the influence of retailers on the competitive dynamics in the retail industry, which subsequently affects the efficacy of a manufacturer's product design.

Résumé

La gestion de produit constitue indéniablement au fondement de la plupart des activités marketing. Alors que les fabricants investissent considérablement dans le développement de produits, la disponibilité de leurs articles pour les consommateurs dépend des actions des détaillants. Cependant, la plupart de la littérature existante sur la gestion de produit a tendance à se concentrer exclusivement sur les fabricants ou les détaillants, en ignorant l'interconnexion essentielle des décisions prises par les deux parties. L'objectif de cette thèse est d'examiner l'interaction dynamique entre les fabricants et les détaillants en termes de leurs décisions sur les produits et de mesurer l'étendue de ces effets grâce à la recherche expérimentale.

Nous présentons deux études qui examinent les effets des décisions sur les produits des détaillants sur la performance des fabricants ainsi que l'efficacité des stratégies des fabricants. L'essai 1 examine l'impact de la suppression de produits, une stratégie fréquemment utilisée dans l'industrie du commerce de détail hautement concurrentielle, sur les ventes des fabricants. En particulier, nous comparons les stratégies de suppression de produits utilisées par les détaillants et les fabricants, et nous démontrons que la suppression de produits, une initiative du détaillant, a un impact négatif sur les ventes des fabricants. En revanche, l'élimination de produits, une initiative du fabricant, n'a aucun effet sur les ventes. Pour protéger leur position sur le marché en réponse à la suppression de produits, les marques peuvent accroître la similarité au sein du produit tout en diminuant la similarité entre les produits afin que les consommateurs soient plus enclins à choisir un substitut au sein de la marque.

Le deuxième essai examine l'influence des détaillants dans la modulation de l'efficacité de la conception de produit d'un fabricant, en se concentrant spécifiquement sur l'exemple des allégations nutritionnelles. Nos résultats indiquent que l'efficacité des allégations nutritionnelles

diminue lorsque les détaillants augmentent le nombre de produits comportant de telles allégations. Les détaillants peuvent influencer indirectement l'efficacité des stratégies des fabricants en impactant la dynamique concurrentielle à travers l'assortiment de produits et de marques. Cet essai améliore le corpus existant de connaissances sur la gestion de produit en soulignant l'importance de l'influence indirecte des détaillants sur le succès de la conception de produit. Afin de créer de nouveaux produits attrayants ou de gérer efficacement un dossier de produits existants, les gestionnaires doivent évaluer attentivement le paysage de la vente au détail actuel.

Les deux essais contribuent de manière significative au corpus existant de la littérature sur l'interaction fabricant-détaillant et la gestion de produit. Les conclusions des deux études soulignent l'impact des choix marketing et des sélections d'assortiment des détaillants sur l'efficacité des stratégies de produit des fabricants, ce qui constitue un aspect relativement peu exploré des interactions entre fabricants et détaillants par rapport à d'autres stratégies marketing telles que la tarification et la promotion. Les fabricants s'efforcent de développer et de gérer leur gamme de produits, néanmoins le choix final de ce qu'il faut acheter est finalement influencé par la gamme de choix offerte en magasin. Ainsi, les efforts marketing menés dans les points de vente physiques et la rivalité entre les marques ont un impact significatif sur les choix des consommateurs ainsi que le succès global des fabricants. Deuxièmement, une lacune existe dans la focalisation sur la suppression de produits dans la dynamique fabricant-détaillant dans la littérature sur la gestion de produit. Le premier essai enrichit le corpus existant de connaissances en se concentrant sur les répercussions de la suppression de produits sur les fabricants et en offrant des recommandations managériales sur la manière de les atténuer. Troisièmement, le rôle des détaillants dans le changement de l'intensité de la concurrence entre les fabricants a été négligé dans l'étude des effets des stratégies de produits sur les ventes. Le deuxième essai comble cette

lacune en examinant l'influence des détaillants sur la dynamique concurrentielle dans l'industrie du commerce de détail, ce qui affecte par la suite l'efficacité de la conception de produit d'un fabricant.

Acknowledgements

I would like to first express my deepest appreciation to my supervisors, Professor Laurette Dubé and Professor Yu Ma, for their invaluable support, guidance, and inspiration throughout the journey. I could not have undertaken this journey without their patience and care.

I am also thankful to Professor Onur Bodur, my Ph.D. thesis committee member, for his generous support and feedback on my research. I would also like to thank all the professors of the Joint PhD program and all of the members and staff at Desautels Faculty of Management at McGill University for their support during my studies.

I'm extremely grateful to my families, who lived far away but supported me unconditionally. Their encouragement has kept my spirits and motivation high throughout this endeavor. I love you and thank you.

Contribution to Original Knowledge

This dissertation enhances the existing knowledge of marketing research by analyzing the interrelationship between manufacturer and retailer product choices and quantifying the extent of these influences through empirical investigations. This research diverges from the majority of studies on manufacturer-retailer interaction in product management by deviating from theoretical approaches that have limited scenarios, such as those involving only one manufacturer and one retailer, or one manufacturer and two retailers. Instead, this research employs consumer purchase data to quantifiably identify product strategies and measure sales performance. Furthermore, we facilitate the involvement of various renowned manufacturers and retailers in the category who adhere to the growing rivalry in the market. The findings of two essays in this dissertation illustrate that retailers' choices regarding the range of products they offer have substantial effects, both directly on manufacturers' sales by including or excluding their products, and indirectly on the effectiveness of product attributes influencing the competitive landscape, which encompasses all products available in the store.

Furthermore, there is a notable absence of emphasis on the process of product removal in the existing body of literature on product management. The first essay contributes to the current knowledge by examining the consequences of product removal for manufacturers and providing management suggestions on how to mitigate these effects. Additionally, the impact of retailers on altering the level of competition between manufacturers has been overlooked in research on the influence of product strategies on sales. The second essay investigates the impact of retailers on competitive dynamics, which in turn influences the effectiveness of a manufacturer's product design.

Contribution of Authors

The primary author of this dissertation is Wanyu Li. She conducted the literature review and developed the hypotheses, analyzed the data, and discussed the results independently for both manuscripts. This thesis was supervised by Professor Laurette Dubé and Professor Yu Ma, who provided regular feedback and guidance.

Professor Yu Ma and Professor Laurette Dubé are the second and third author of the manuscript “Rethinking Product Removal: A Dual-Perspective from Manufacturer and Retailer”. For the second essay, “Marketing Actions Moderates the Effectiveness of Nutrition Claims on Brand Sales”, Dr. Hajar Fatemi, the assistant professor at Univeristy of Windsor is the second co-author and Professor Yu Ma and Professor Laurette Dubé are the third and fourth author. The primary contribution of the co-authors was to provide critical feedback and evaluation of the work, as well as suggestions for improving the manuscripts' structure and content.

1. Introduction

1.1 Background

Product management is a fundamental marketing process that addresses diverse customer needs and creates competitive advantages through proactive planning, evaluation, and, if necessary, discontinuation of products offered by a company (Kirca et al., 2020). Product manufacturing companies have historically concentrated on various aspects, including design, procurement, production, and marketing (Toffel, 2003). Once a product left the factory, the manufacturer's involvement was primarily limited to providing post-sales support, such as maintenance and repairs. A substantial body of literature has investigated the benefits of innovative product management activities (e.g., Pauwels et al., 2004; Rubera & Kirca, 2012). It is widely acknowledged that a diverse product portfolio enhances a company's sales by meeting varied customer requirements (Wan et al., 2012). The development of pioneering products, in particular, has both immediate and long-term impacts on a firm's financial performance (Kang & Montoya, 2014). Consequently, managers have recognized the significance of products for a company's success, as they enhance client retention and, consequently, improve corporate performance (Candi, 2010; Hertenstein et al., 2005).

While manufacturers invest significant efforts in product development, the accessibility of their products depends on the actions of retailers. Many manufacturers use an indirect distribution channel to introduce their products to the market. There has been extensive discussion concerning the perceived shift in power dynamics from manufacturers to retailers, driven by the consolidation of the retail sector, the proliferation of trade promotions, and the rapid expansion of store brands (Ailawadi et al., 2010). One notable example is the ascent of Wal-Mart, whose remarkable

operational efficiencies give it an advantage over competing chains such as Kmart and Target (Geylani et al., 2007). This advantage enables Wal-Mart to offer significantly lower retail prices and generate higher sales volumes for many products. With such high volumes, Wal-Mart can negotiate concessions from its suppliers through reduced prices or quantity discounts (Mottner & Smith, 2009). As Wal-Mart's suppliers have become reliant on the company to maintain specific sales volumes, they have found themselves in a less favorable negotiating position, potentially facing pressure to make financial concessions (Bloom & Perry, 2001).

Existing literature on product management strategies focuses either on manufacturer-specific strategies, such as product line extension (Chunawalla, 2008), product lifecycle (Terzi et al., 2010), or retailer-specific strategies, such as assortment optimization. However, the effects of these product tactics extend beyond the decision-maker. For example, the product decisions of manufacturers can influence retailers' performance by introducing unique products, improving product quality, and adjusting price and promotion strategies for certain products. On the other hand, retailers' assortment decisions on product listings and purchase quantities guide manufacturers in managing current products and developing new ones. The practice of category captainship, where retailers rely on a chosen supplier to manage their category assortments, is a typical example of such interaction between manufacturers and retailers (Kurtuluş et al., 2014). However, most of the literature on product management tends to concentrate on manufacturers or retailers, ignoring the crucial interdependence of the decisions made by the two parties. It is well known in economics studies that when manufacturers' decisions are modeled without taking into account the actions of retailers, the analysis may fail to consider the retailers' joint profit-maximizing effect and overestimate the level of manufacturer cooperation. On the other hand, focusing only on the retailer and ignoring the manufacturers could cause one to overestimate how

a store reacts to demand shocks and incorrectly suggest that the retailer does not adopt a joint-profit-maximizing strategy (Villas-Boas & Zhao, 2005). Understanding and quantifying the intricate interplay between the product strategies of manufacturers and retailers is vital to gaining a holistic view of product management in the retail environment.

1.2 Research Objectives

This dissertation aims to investigate the dynamic interplay between manufacturers and retailers' product decisions and quantify the magnitudes of such effects with empirical studies. To achieve this goal, in Chapter 2, we will first review product management in general for manufacturers and retailers (2.1, 2.2). Subsequently, the next section (2.3) presents a concise overview of the historical progression of power dynamics within the realm of commerce, specifically focusing on the transition of influence from manufacturers to retailers. The determination of the initiator of assortment decisions is frequently influenced by the bargaining strength of manufacturers and retailers, resulting in a situation where the party with more significant power tends to benefit at the expense of the weaker party.

Section 2.4 examines the interactions pertaining to product decisions between retailers and manufacturers. For example, retailers can selectively choose which products from manufacturers' lines they carry and may even develop their own brands as a means of competition. Additionally, powerful manufacturers may prioritize their own interests over those of retailers who rely on them to manage their assortments through a captain leadership contract. This section aims to synthesize the existing research on the interactions between manufacturers' product decisions and retailers' assortment decisions.

The dynamic interface formed by manufacturers and retailers involves not only the focal companies but also competing manufacturers and retailers, implying the importance of the

competitive environment in influencing and being influenced by both sides' strategic actions. Section 2.5 examines the literature on competitive dynamics in general and on product management in particular. The latter portion of the literature review (2.6) aims to identify gaps in the current field of research and elucidate how these gaps are addressed by the two essays presented in this dissertation.

In Chapters 3 and 4, we present our two essays on studying the impacts of retailers' product decisions on manufacturers' performance and the effectiveness of manufacturers' strategies. More specifically, Essay 1 (Chapter 3) studies the impact of product removal, a frequently adopted practice in the increasingly competitive retail environment, on manufacturers' sales. More specifically, we contrast the product removal strategies adopted by manufacturers and retailers and demonstrate that while product elimination, a manufacturer's product removal initiative, has no effect on its sales, product delisting, a retailer's product removal initiative, has a negative effect on manufacturers' sales at both aggregate and individual levels. Some moderators and mitigation strategies are investigated in Essay 1 to provide actionable insights for managers.

The second essay (Chapter 4) examines the role of retailers in moderating the effectiveness of a manufacturer's product design using the case of a nutritional claim (a short message about the product's nutritional information printed on the product's packaging). Our results suggest that the effectiveness of nutrition claims decreases as retailers list more products with such claims. In other words, retailers can indirectly affect the effectiveness of manufacturers' strategies by altering competitive dynamics. The essay contributes to the product management literature by highlighting the significance of retailers' indirect role in influencing the success of product design. To develop attractive new products or manage an existing product portfolio, managers should carefully assess the current retail environment.

In Chapter 5, we discuss the theoretical findings in the product management and channel coordination literature as well as managerial implications for manufacturers and retailers. Some limitations are also discussed, and practical suggestions for further studies are made to advance the field.

2. General Literature Review

2.1 Product Management Defined

According to Al Muala (2012), a 'product' is an item that a company provides in the marketplace. Products are the tangible goods and services that can be provided to potential consumers for consumption and to fulfill demand. The core product relates to key benefits that clients obtain when they make a purchase (Han et al., 2019). Physical product characteristics pertain to a product's components, degree of excellence, attributes, packaging, and other aspects that are integrated to give primary benefits. The term 'product' refers to the inclusion of additional features and amenities in the physical and core product. The product is at the heart of the marketing mix approach and is distinguished by its durability, layout, attributes, name-brand, and dimensions (Foroughi et al., 2016).

Product management comprises all tasks related to product planning based on the objectives of the company, i.e., product, place, price, and promotion. The core company strategy and plan for marketing, whence the product plan arises, are included in product planning. Product planning takes into account not just existing products but also the launch of new items, from ideation to licensing. Product management encompasses the complete marketing management spectrum, including pricing, promotion, and the distribution of new items (Chunawalla, 2008).

2.2 Product Portfolio

Manufacturers:

Most companies manage more than one product to satisfy various consumer segments. A group of similar or closely related products offered to consumers is referred to as a product line (Chunawalla, 2008). The total number of products within a product line is referred to as its length.

A product portfolio (also referred to as a product mix) consists of all products offered by an organization, often including multiple product lines with various models, styles, or sizes (Chunawalla, 2008). The strategic development of product lines plays a vital role in enabling businesses to effectively compete in the marketplace and meet the diverse demands of customers with varying preferences (Morgan et al., 2001). Marketing research suggests that companies benefit from new product designs and innovations that diversify their product portfolio and reduce the risk of counting on a few popular products (Day, 2007). Conventional rewarding schemes that link department performance with increased earnings, market share, or sales of new products foster a tendency among marketing managers to expand current product portfolios with the aim of augmenting short-term outcomes. Salespeople may request management to continue adding things to a product line in order to keep their consumers satisfied (Wei et al., 2015).

However, continuously expanding the portfolio leads to an increase in complexity in production, resource allocation, and consumers' decision-making processes (Fernhaber & Patel, 2012; Thompson et al., 2005). Product proliferation can also result in a vast and overly diverse product line in which the expansion begins to spiral out of control, leading to a loss of market concentration, market share, and brand positioning (More, 2009). When the coordination and communication costs of managing a diverse portfolio outweigh the benefits (Chandy et al., 2006), managers must determine which products need to be removed. For instance, Kirca et al. (2020) investigated the product portfolio strategies in the U.S. automotive industry. In order to maintain a focused portfolio, firms like General Motors must strike a balance between developing new models and streamlining existing offerings due to the high costs associated with new product development and the rapid changes in technology and consumer preferences. A corporation whose goal is to make more money will have a limited product line that only includes goods that

contribute significantly to revenues (Zott & Amit, 2008). It is an ongoing process of a broader product line preceding a reduced product range in the span of an organization (Kirmani et al., 1999). The key concept is that a business's line of goods reflects the organization's aims, the targeting chosen, and customer behavior in a specific market (Damanpour, 2010).

Retailers:

The sets of products offered in a retail store at any given time define the retailer's assortment. Just like product planning for manufacturers, assortment planning is a crucial part of the marketing mix for retailers to acquire and retain consumers (Bauer et al., 2012). The goal of assortment planning is to create an assortment that maximizes earnings or gross profit while considering various constraints, such as limited funds for product purchases, constrained shelf space for displaying products, and other obstacles (Cachon et al., 2005). Assortment variety, quality, and price are key components to differentiate the retailer from its competitors (Simonson, 1999) and determine the market position and image of the retailer (Ailawadi & Keller, 2004). Empirical research suggests that assortment is a major predictor of retail patronage (e.g., Pan & Zinkhan, 2006), perceived merchandise value (Baker et al., 2002), and both current and future product choice (Simonson, 1999). Assortment planning is critical to a retailer's long-term success because of its impacts on store selection, purchase amount, and customer loyalty.

Retailers are expected to provide the right sets of products at the right price, at the right time, and in the right places (Gruen & Shah, 2000). The composition of a "good assortment," however, remains one of the most challenging tasks for retailers (Bauer et al., 2012). The discussion has been intense in terms of assortment level (Sethuraman et al., 2022). The variety of products a store carries has a significant impact on revenues and profit margins, making assortment planning a major focus for vendors, experts, and software developers. However, a dominant

method for assortment planning has not yet emerged, offering an excellent opportunity for academics to contribute (Kök et al., 2019). Several circumstances may necessitate changes in supplier assortment. With limited retail space and budgetary constraints, choosing an assortment requires a trade-off among three factors: the number of distinct product lines the retailer carries (referred to as breadth), the number of SKUs held in each category (referred to as depth), and the quantity of inventory stocked for each SKU, which directly affects their in-stock rate. The breadth versus depth trade-off is a fundamental strategic decision that all retailers must make (Gopalakrishnan et al., 2023). Some retailers, such as department stores, may choose to carry a wide range of products. Assortment planning is a relatively recent but rapidly expanding academic field of study. The academic approach to the assortment planning challenge is based on the development of an optimization problem to select the ideal collection of products to carry and the inventory level of each item (Kök et al., 2019).

2.3 Retailer and Manufacturer Power Balance in General

During the 1960s, a shift in leadership within various industries led to the recognition of profit potential through economies of scale. As a result, multiple distributors emerged, expanding their reach through additional locations and acquisitions of competitors and resulting in significant changes in channel structure and conduct (Messinger & Narasimhan, 1995). The repeal of the maintenance of resale prices in 1964 further strengthened the influence of retailers. The growing power of multiple retailers to shape brands' marketing strategies, coupled with their ability to control access to the retail marketplace, raises concerns about the future of brands. Marketers can better respond to the increasing dominance of multiple retailers by understanding consumers' perceptions of the competitive landscape in the packaged grocery markets (de Chernatony, 2012).

The increased investment in manufacturing facilities has prompted firms to reconsider their dependence on distributors. Toward the latter part of the 19th century, prominent manufacturers began associating an identity with their products, engaging in consumer advertising, and employing their own salespeople to exclusively deal with larger shops. The era of wholesaler supremacy was relatively brief, and King (1970) observed that around 1900, the period of manufacturer supremacy commenced, lasting until the early 1960s (de Chernatony, 2012).

There has been extensive discourse surrounding the perceived shift in power dynamics from manufacturers to retailers, driven by the consolidation of the retail sector, the proliferation of trade promotions, and the rapid expansion of store brands (Ailawadi, 2001). Nash's (1950) bargaining theory in buyer-seller negotiations has received support from Neslin and Greenhalgh (1983). Dukes et al. (2006) assert that bargaining between competing manufacturers and retailers regarding wholesale prices occurs without manufacturers having visibility into the prices retailers establish for consumers. This arrangement assumes that manufacturers do not anticipate changes in retail prices when determining wholesale prices, and conversely, retailers do not anticipate fluctuations in wholesale prices when setting retail prices. Consequently, manufacturers are unable to commit to maintaining fixed wholesale price levels, a situation that becomes particularly relevant with the emergence of big-box retailers and thus increases the bargaining power of retailers (Draganska et al., 2010).

Strategies to cope with retailer power vary in their applicability across different categories of suppliers, encompassing both food and non-food vendors, as well as large and small vendors. According to Burke (1984), these options can be categorized as follows:

(a) Competitive tactics that distinguish between convenience and non-convenience locations, presenting distinct approaches and opportunities for differentiation.

(b) Horizontal approaches, involving competitive strength achieved through acquisitions, mergers, or partnership arrangements.

(c) Global marketing and its relationship with local retail frameworks.

(d) Vertical approaches, entailing vertical integration either as a strategy or as a product.

The shift in power dynamics favoring retailers is largely a response to the historical market dominance of suppliers. The current imbalance in the degrees of consolidation for both sellers and buyers might necessitate greater supplier reconfiguration. Merely having competition among manufacturers does not effectively restore bargaining power, as the absence of robust rivalries can still result in increased purchasing power. The balance of negotiation power between various groups of consumers and vendors varies significantly, and the connections between major manufacturers and prominent retailers are influenced by factors such as the type of product, the structure of the market (Segal-Horn & McGee, 2012) and the availability of demand information (Chu & Messinger

, 1997).

In negotiations between a retailer and a manufacturer, the manufacturer is in a better bargaining position when consumers are more informed about product attributes. Studies such as Kadiyali et al. (2000) and Sudhir (2001) use structural models to estimate the distribution of channel power for several consumer products. In a specific product category, it's common for many retailers to stock brands from multiple manufacturers. These retailers, which offer a variety of products, often cater to consumers who enter their stores with a clear intention to make a purchase but haven't decided on a specific model or brand. This gives an incentive to manufacturers to inundate consumers with product information, by using advertising, for example, before they can

make a retailer choice. By doing this, manufacturers use marketing strategies at their disposal, which can steer market power towards a chosen partner retailer (Dukes et al., 2006).

Empirical models are developed to estimate the relative power of manufacturers and retailers in a channel. For instance, Choi (1991) investigates the variations in channel profits for two competing manufacturers and one common retailer under different scenarios. Specifically, the study explores if the interactions are vertical Nash (equal in power) or Stackelberg leader-follower, and who the leader is in the latter case. Each of the three-channel interaction scenarios discussed in this context presents distinct implications for the profitability and power distribution of manufacturers and retailers. Kadiyali et al. (2000) extend this model by allowing for a continuum of possible channel interactions and testing its fit with market data in the tuna and refrigerated juice categories. They find that the retailer in their study has more pricing power, measured by markup, in both categories.

2.4 Product Management Interactions between Manufacturers and Retailers

Product portfolio or product line design is more challenging for manufacturers who adopt indirect distribution channels as they lose full control of the ultimate targeting of the products in the line (Villas-Boas, 1998). The retailers may solely have their own interests in mind when determining price and how products are shown to customers. An auto dealer, for instance, would typically carry the cars that are “fast-selling” and discard the ones that are “hard-to-market.” Naturally, the dealer's intended targeting tactics determine which of these classifications to focus on—the low-price market or the high-end market. The manufacturer might compel the dealer to stock larger, “hard-to-market” vehicles in exchange for carrying the compact, “fast-selling” versions in order to regain control over the market (Villas-Boas, 1998). Generally speaking, the

manufacturer must create a product line that the retailer is willing to target and wants to carry the entire line of.

Furthermore, retailers exert a substantial impact on the product portfolio decisions and sales performance of manufacturers through the establishment of private label products. Private labels refer to brands that are owned by retailers and have a crucial role in enhancing both profitability and the establishment of store loyalty and brand image for the retailers (Ailawadi et al., 2008). Traditionally, private-label products have been known for their comparable quality to national brands but at lower prices. This is primarily due to reduced costs in advertising and distribution. However, retailers have begun to implement a multi-tiered private label strategy. This strategy includes economic private labels, which are typically cheap and of low quality. Additionally, there are standard private labels that offer somewhat lower prices while maintaining quality comparable to that of national brands. Finally, there are premium private labels that provide high-quality products with added value (Hökelekli, 2017). National brands can enhance their market share by incentivizing retailers to increase their product offerings and expand their assortment. Research has indicated that merchants who rely on a diverse range of items from multiple manufacturers to attract customers tend to have lower penetration of private labels (Dhar, 1997). Furthermore, it is worth noting that a dominant player within a specific category may exhibit satisfaction upon observing an increase in market share of store brands, particularly if it occurs at the detriment of one of its subordinate national brand rivals (Dhar, 1997). According to Baskaran (2018), manufacturers can take advantage of the introduction of a private label that does not directly compete with existing listed brands as an opportunity to conduct a market test. This allows them to gain insights into the response of a new sector and make revisions to their new product development plans.

Powerful manufacturers have the ability to exert strong influence over the assortment of merchants. Category captainship is one of the examples. Category captainship refers to a retail strategy in which a manufacturer or supplier assumes a prominent and cooperative position in the management and enhancement of a particular product category inside a retailer's establishment (Alan et al., 2017). The category captain, commonly identified as the manufacturer possessing specialized knowledge in a specific product category, collaborates closely with the retailer to enhance the overall performance of that category. The role of the category captain involves active involvement in the creation of the product assortment and layout within the category as well as in influencing decisions related to the positioning of products, allocation of shelf space, and development of merchandising methods. The practice helps retailers enhance the attractiveness of the category to consumers. For instance, according to a report from Progressive Grocer (2004), General Mills, in its role as category captain in the Baking Ingredients and Mixes category, has observed a significant rise of 10.2% in base dollar volume for one of the retailers following the implementation of General Mills' SKU simplification initiatives. Despite the enhancement in performance, some drawbacks of captain leadership are also well recognized by retailers, including the loss of control and the fact that manufacturers exploit the opportunity to eliminate competition (Desrochers et al., 2003). To mitigate the level of authority vested in category captains, retailers may opt to designate an additional manufacturer within the category to assume the role of co-captain (Bandyopadhyay et al., 2009). This entails utilizing them as advisors to validate the proposals put forth by the category captain. Retailers also frequently exercise the prerogative to engage in renegotiations of category captainship contracts, sometimes by proposing short-term agreements spanning a duration of one to two years. The primary objective of category captainship

agreements is to achieve a balance of power within the supply chain, with a focus on short-term outcomes (Kurtuluş & Toktay, 2015).

Disputes frequently emerge between manufacturers and retailers with respect to pricing and margin agreements, promotional tactics, and inventory management. In certain cases, the conflicts may lead retailers to temporarily remove one or more brands from their shelves until the disagreements between the retailers and manufacturers are resolved. This is referred to as conflict delisting in the literature (Van der Maelen et al., 2017) and occurs more often when there is a somewhat balanced distribution of negotiating power between the two parties involved. Researchers report that while both manufacturers and retailers could experience significant losses in sales, retailers tend to be more vulnerable, especially when the manufacturer's brand is of high equity (Van der Maelen et al., 2017). Without these high-demand products, retailers may lose significant traffic to nearby stores (Li & Wan, 2023). This assortment decision affects both parties' market returns in addition to short-term sales. The market reacts more negatively to manufacturers (versus retailers) and the initiator of the conflict. Other factors, such as the size of the delisting and brand strength, also moderate the effect of conflict delisting on firm value (Hermans et al., 2024).

2.5 Competitive Dynamics and Product Development

Competitive dynamics involve a series of actions and reactions among firms in an industry, reflecting their continuous efforts to seek profits and improve their competitive advantage and position. Lamberg et al. (2009) state that firms exhibit creativity in their actions to achieve these goals, and successful actions often lead to competitive reactions from rivals aiming to counter or replicate the action. Understanding competitive dynamics is crucial, as it sheds light on how firm actions impact competitors, competitive advantage, and consumer perceptions. Research on competitive dynamics started in the 1980s and has since examined the causes and effects of

competitive actions and reactions across various industries. To comprehend profits and competition fully, it is essential to analyze the interplay and consequences of these actions and reactions, as emphasized in Schumpeter's theory of creative destruction.

Schumpeter's concept of creative destruction has served as a significant driving force behind the exploration of competitive dynamics. This idea pertains to the decline of leading firms in the market due to the process of competitive actions and reactions (Diamond, 2006). Essentially, when leaders undertake innovative actions to pursue new opportunities, their rivals respond with actions aimed at undermining the leaders' advantages. According to Schumpeter, the manner in which both leaders and challengers act and react will determine their long-term performance and survival in the market.

Young et al. (1996) and Ferrier et al. (1999) have advanced Schumpeter's ideas and believed that competition is a dynamic market process rather than a static market outcome, as neoclassical economists believe. Entrepreneurial discovery is defined as the action of successfully directing the flow of resources toward the fulfillment of consumer needs when a market opportunity arises. From a competitive dynamics perspective, entrepreneurial discovery has led researchers to focus attention on the market and profit effects of innovative actions, such as radical actions that disrupt the status quo.

The concept of the actor in competitive dynamics research refers to the firm carrying out a competitive action. The actor is important because it is the originator of an action and the beneficiary, both positively and negatively, from the action outcome (Hitt et. al., 2011). Organizational characteristics that influence strategic action can be classified into three categories: awareness, motivation, and cognitive and resource-based factors (Giachetti & Dagnino, 2021). Awareness pertains to a company's level of understanding regarding its competitors, the

factors that fuel competition in its industry, and the overall competitive landscape. Motivation encompasses the incentives that prompt a company to act, which could be driven by perceived advantages or disadvantages. The capacity to act is shaped by the firm's decision-making procedures and its available organizational resources, including unutilized resources. TMT demographics are also linked with the speed with which actions (and responses) are conceived of and implemented (Agnihotri & Bhattacharya, 2022). These organizational characteristics underscore the importance of the ability to carry out action.

Research in competitive dynamics has emphasized examining the attributes of individual actions and responses, as well as the interconnection between action-response pairs (Smith et al., 2005). The attributes of an action, including its level of innovation, extent, scale, and irreversibility, play a crucial role in forecasting competitive reactions. Furthermore, scholars have explored the sequencing of actions, considering whether the firm initiated the response first or second, among other possibilities. The extent of an action pertains to the resources required for its execution, while the breadth of the action has been assessed by examining the potential impact it may have on a given number of competitors (Islami & Topuzovska, 2020). David (2011) and Ferrier (2001) investigate the attributes of a continuous sequence of competitive actions conducted over a period, including aspects such as the quantity or scale of actions within the sequence, the typical duration of an unbroken series of actions, and the intricacy of the sequence.

Competitive actions undertaken by firms can be categorized into two types: tactical moves and strategic moves. Tactical moves involve the utilization of limited and general resources, such as discounts, promotions, or service improvements (Chen & MacMillan, 1992). On the other hand, strategic moves require more specific resources and time, such as expanding facilities, forming strategic alliances, or introducing new products and services (Baum & Korn, 1996). Among these

actions, decisions on market entry and exit, in particular, are crucial competitive interactions and key among strategic moves. These acts allow businesses to define or redefine their market positions and competitor relationships by making or avoiding market overlap (Baum & Korn, 1999). While the executives of firms handle market level decisions, marketing managers face the same challenge at the product level.

In the context of product management, the competitive landscape plays a crucial role in motivating companies to allocate resources towards research and development activities, hence cultivating a culture that emphasizes ongoing innovation in the realm of product development (Katila & Chen, 2008). The potential competitive advantage linked to a novel product might be rapidly diminished by the innovation endeavors of competitors. Consequently, it is imperative for a central firm to diligently monitor indicators that reveal the innovation efforts of rivals in order to anticipate their moves. Bowman and Gatignon (1995) have conducted research that demonstrates firms' tendency to respond to the launch of new products by their competitors. Similarly, Katila and Chen (2008) have observed that the exploration and exploitation activities of rivals can have an impact on both the frequency and innovativeness of new product releases by a focal firm.

The optimal timing and method of introducing new products are influenced by the competitive environment, particularly in businesses with products that have a very short lifespan and see a rapid decline in revenue after debut, like the motion picture industry (Krider & Weinberg, 1998). Companies who are the first to launch a new product have "first-mover" advantages (Lieberman & Montgomery, 1988) and can potentially earn monopoly profits by being the sole player in a specific market (Varadarajan et al., 2008). Later entrants find it challenging to seize the market position held by first-mover products, particularly when innovative products build a strong

reputation and loyal customer base. In addition, firms who are first to market gain from learning advantages that others who follow do not have (Barnett & Freeman, 2001). Consequently, researchers in competitive dynamics have focused on identifying strategic actions that can capitalize on delayed retaliation or maximize the benefits of timing in order to achieve success (Chen & MacMillan, 1992).

On the other hand, the uncertainty about the new market and the risks of innovation failures delay firms' timing of entry (Mitchell, 1989). While the first-mover firm invests lots of resources in innovation and gains a temporary advantage over its competitors, the rivals can benefit from knowledge spillovers and come up with similar or even superior products with much lower costs (Khanna, 1995). Competitive advantages arise when organizations await entering the market with more advanced products which usually outperform earlier ones in price, quality, or both (Barnett & Freeman, 2001). By successfully replicating the products, competitors shorten the durability of the "first-mover" advantages and diminish their prospective earnings (Lee et al., 2000). As a result, firms whose capacity to maintain the value of important product characteristics, compared to those of subsequent competitors, tend to enjoy a longer period of their first-mover advantages (Kerin et al., 1992).

While there is some existing literature on market exit, the majority of research is centered around the tactics employed by firms to determine if and when they should withdraw from the market (Stavins, 1995). Decisions about the discontinuation of products are equally challenging yet crucial, particularly for organizations that offer multiple products. The longevity of products in the market is significantly influenced by external competitive pressures and the market structure (de Figueiredo & Kyle, 2006). External competitive pressures, emanating from rival companies striving for dominance, create a dynamic environment where products must continually adapt,

innovate, and meet evolving consumer demands to remain viable. The intensity of competition often compels businesses to enhance the quality, features, and overall value of their products to gain a competitive edge. Empirical study indicates that a product's likelihood of discontinuation is greater when it encounters intense competition from other items within the company's portfolio or products offered by rival companies in the industry (Khessina & Carroll, 2008).

2.6 Gaps in the Literature

2.6.1 Lack of discussion in channel interaction between manufacturers' product and retailers' assortment decisions

The academic studies on the interaction between manufacturers and retailers can be categorized into two main groups (Ailawadi et al. 2010). The first category is to ascertain the equilibrium of power between them by examining the pricing dynamics and comparing their respective profit shares. The researchers want to determine if the manufacturer or the retailer holds the dominant position in the channel, known as Manufacturer-Stackelberg and Retailer-Stackelberg, respectively. Additionally, they seek to detect if there is a stable equilibrium channel structure, referred to as vertical Nash (Choi, 1991). For example, Sudhir (2001) provides evidence of the Manufacturer-Stackelberg relationship in the yogurt and peanut butter categories and that retailers maximize category profits not just brand profits. When wholesale prices are accessible, the relative power can also be deduced by comparing the proportion of channel profit. In a retailer-Stackelberg channel, retailers capture a larger portion of channel profits compared to manufacturers, ranging from 57% to 72% (Kadiyali et al., 2000). On the other hand, in a Manufacturer-Stackelberg channel, the retailer's margin is 50% lower than that of the dominant brand and approximately equal to that of the smaller brands. Building on the theoretical work of

Iyer and Villas-Boas (2003), Draganska et al. (2010) consider the case of multiple rival retailers and manufacturers. They demonstrate that the relative power of a firm depends on the characteristics of the negotiation partner, such as the size of the firms, private label share, and retailers' assortment depth.

The second stream of research focuses on analyzing the utilization or prospective utilization of different marketing methods as sources of leverage for retailers or manufacturers (Ailawadi et al., 2010). The topic of promotion-related strategy is widely studied by researchers, with a particular focus on quantity discount, which involves retailers receiving a discount for purchasing a larger quantity of a product (Jeuland & Shugan, 2008), and trade promotions, which involves manufacturers offering price cuts to retailers (Moorthy, 2005). The former primarily consists of theoretical research conducted for a single manufacturer (Kolay & Shaffer, 2013; Raju & Zhang, 2005). The latter topic is more extensive, and empirical studies that include several manufacturers in the context investigate issues such as own and cross-brand pass-through (Besanko et al., 2005) or the timing of pass-through (Meza & Sudhir, 2006).

In terms of pricing, scholars have examined the efficacy of price discrimination, a tactic in which manufacturers and retailers set different prices for different segments of consumers (Liu & Zhang, 2006; Besanko et al., 2003), as well as over different time periods (Cosguner et al., 2017). Manufacturers can also engage in distribution channel price discrimination by establishing varying prices across different channels (Ceullar & Brunamonti, 2014). While the former three articles use counterfactual analysis to estimate the extent of the impact, Ceullar and Brunamonti (2014) offer empirical proof of the utilization of channel pricing discrimination. Some other topics on pricing strategies include timing of the pricing (e.g. Matsui, 2018) and the pricing and return policy for perishable commodities (e.g., Pasternack, 2008).

The leverage of private labels for retailers is another major topic in the channel interaction literature. Empirical research in different product categories confirms that the launch of private labels increases retailers' margins for the national brand (Chintagunta et al., 2002; Pauwels & Srinivasan, 2004) and such increases are positively related to the share of the private label in a category (Ailawadi & Harlam, 2004). The impact on manufacturers varies by the similarity of the private label and the national brand. Pauwels and Srinivasan (2004), for example, discovered that while the introduction of private labels benefits premium-priced national brands, it harms the performance of second-tier national brands. Meza and Sudhir (2010) show that national brands that are imitated by a private label endure greater competition and are more likely to reduce their wholesale prices, whereas non-imitated national brand prices remain steady.

In contrast to the vast amount of research on other marketing strategies, there is scant research on how manufacturers and retailers interact on product or assortment management (Ailawadi et al., 2010). Some researchers are interested in retailers' role in manufacturers' product line design and focus on horizontal versus vertical product line extension decisions within a channel. Vertical product differentiation involves providing a product line that consists of several goods with varying quality levels. For the products to be targeted towards the correct segments, manufacturers in an indirect distribution channel face resistance from retailers to comply with their marketing plans because strategic retailers may exploit the variety of the manufacturer's product mix and only target the high-margin consumer segments, which increases the cannibalization forces across the product line. In this case, Villas-Boas (1998) argue that the optimal strategy for manufacturers to design products for a distribution channel is to differentiate the products being supplied to the intermediate in comparison to what they sell directly or through a coordinated channel. Line extensions can also be horizontal, where the quality of products is the same, but the

attributes vary, such as color or flavor. Liu and Cui (2010) find that manufacturers should offer a longer product line in the case of a decentralized channel, where decision-making authority and control are dispersed among several entities within the channel. Extending the product line horizontally can help the manufacturer lessen the double marginalization problem in a decentralized channel, where both upstream and downstream firms in a supply chain or distribution channel apply their own markups to the price of a product, leading to higher prices for the end consumer than would be optimal for overall market efficiency. Other similar work on product strategies in the channel includes the study done by Rajagopalan and Xia (2012), which investigate optimal product variety and channel differentiation, as well as the one done by Xiao et al. (2013), which examine the business model where companies offer personalized design through their direct channel to avoid channel conflict. However, this body of research is mostly theoretical and often constrained within a limited number of channel members, which contrasts with the increasing competition in the number of manufacturers and products as well as retailers in the market.

The two essays in this dissertation fill in the gap by empirically analyzing the impacts of product strategies among several major manufacturers and retailers. Table 1 summarizes the key references in this stream of work.

Table 2-1 Summary of sample references in channel interaction literature

Sample Reference	Focus	Topic	Method	Setting
Choi (1991)	Channel Structure	Pricing interaction	Theoretical	Two manufacturers; One retailer
Sudhir (2001)	Channel Structure	Pricing interaction	Empirical	Two manufacturers; One retailer
Kadiyali et al. (2000)	Channel Structure	Pricing power	Empirical	Two manufacturers; One retailer
Villas-Boas & Zhao (2005)	Channel Structure	Pricing interaction	Empirical	Three manufacturers; One retailer
Iyer and Villas-Boas (2003)	Channel Structure	Bargaining Power	Theoretical	One manufacturer; One retailer
Draganska et al. (2010)	Channel Structure	Bargaining Power	Empirical	Multiple manufacturers; Multiple retailers
Jeuland & Shugan (2008)	Promotion	Quantity discount	Theoretical	One manufacturer; One retailer
Raju & Zhang (2005)	Promotion	Quantity discount	Theoretical	One manufacturer; Two retailers
Kolay & Shaffer (2013)	Promotion	Quantity discount	Theoretical	One manufacturer; Two retailers
Besanko et al. (2005)	Promotion	Trade promotion/ Retail pass-through	Empirical	Multiple manufacturers; One retailer
Meza & Sudhir (2006)	Promotion	Trade promotion/ Retail pass-through	Empirical	Multiple manufacturers; One retailer
Moorthy (2005)	Promotion	Trade promotion/ Retail pass-through	Theoretical	Two manufacturers; Two retailers
Liu & Zhang (2006)	Pricing	Price discrimination	Theoretical	One manufacturer; Two retailers
Besanko et al. (2003)	Pricing	Price discrimination	Empirical	Multiple manufacturers; One retailer
Cosguner et al. (2017)	Pricing	Price discrimination	Empirical	Two manufacturers; One retailer
Ceullar & Brunamonti (2014)	Pricing	Price discrimination	Empirical	Multiple manufacturers; Multiple retailers
Pasternack (2008)	Pricing	Pricing and return policy	Theoretical	One manufacturer; One retailer
Matsui (2018)	Pricing	Pricing timing	Theoretical	One manufacturer; Two retailers
Chintagunta et al. (2002)	Private label	Private label	Empirical	One manufacturer; One retailer
Meza & Sudhir (2010)	Private label	Private label	Empirical	Multiple manufacturers; One retailer
Pauwels & Srinivasan (2004)	Private label	Private label	Empirical	Multiple manufacturers; One retailer
Ailawadi & Harlam (2004)	Private label	Private label	Empirical	Multiple manufacturers; Two retailer
Villas-Boas (1998)	Product	Product differentiation	Theoretical	One manufacturer; One retailer
Liu & Cui (2010)	Product	Product differentiation	Theoretical	One manufacturer; One retailer
Xiao, Choi & Cheng (2014)	Product	Product variety	Theoretical	One manufacturer; One retailer
Rajagopalan & Xia (2012)	Product	Product variety	Theoretical	One manufacturer; Two retailers
This dissertation	Product	Product removal and attribute effectiveness	Empirical	Multiple manufacturers; Multiple retailers

2.6.2 Lack of focus in product removal under channel dynamics

Although line extensions have positive impacts on market position, financial position, and firm value (Rubera & Kirca, 2012), companies are constrained by human resources, financial resources, and production capability to expand their portfolio unlimitedly (Fernhaber & Patel, 2012), let alone the fact that over 60% of new products fail in the market (Ogawa & Piller, 2006). From consumers' perspectives, choice overload may result in less motivation to choose and less satisfaction with their decision (Scheibehenne et al., 2010). Thus, product removal is of paramount importance for companies in addition to the development of new products or the management of existing products. However, no academic research discussed the topic until the 1960s, and it only progressed relatively by the late 2000s (Zhu et al., 2021).

The majority of this research focuses on product elimination, the permanent removal of a product from a firm's portfolio. According to Avlonitis (1984), the initial phase of the product elimination process entails identifying underperforming products that do not satisfy the company's objectives. Next are the analysis and revitalization phases, during which the cause of failure is analyzed to seek possibilities to restore performance (Alexander, 1964; Weckles, 1971). For products that cannot be revitalized, management needs to project the consequences of elimination to prevent unexpected impacts on other products and consumers (Avlonitis, 1984). Finally, it is time for implementation, which includes selecting a phase-out strategy and eventually withdrawing the product from the product portfolio (Avlonitis, 1983).

The key driver of product elimination can be classified into three categories: the performance of the product, internal factors, and external factors (Harness & Harness, 2007; Hart, 1988). The first category concerns sales, profitability, and poor fit with the company's image, strategic plan, and capabilities. Internal factors could be operational problems, rationalization due

to mergers and acquisitions, or the redirection of firm focus and resources. The external factors are out of the firm's control. For example, the elimination decision could be driven by new government policies and regulations, third-party decisions, competitive activity, a decline in market potential, parent company decisions, or new policies. Recent research done by interviewing 102 German mechanical engineering companies confirmed that the reasons to implement product elimination have not changed over time (Bauer & Turčínková, 2020).

The benefits of product elimination fall into three categories (Harness & Harness, 2012). Firstly, it contributes to the simplification and coordination of management and sales efforts. Some examples include less-confusing products, concentration of sales effort, concentration of management effort, simplification of management activity, strategic planning enablement, and fulfillment of regulatory obligations. Secondly, the resources of the eliminated products are reallocated to other financially rewarding products or activities, which leads to an increase in profitability, sales, and competitive position (Avlonitis, 1986). Thirdly, it improves physical and financial resource management, such as stock reduction, easier production control, more efficient use of stores, increased production capacity, and improved financial structure (Avlonitis et al., 2000).

Through a systematic review of the literature on product elimination, Avlonitis and Argouslidis (2012) find that the consequences of product elimination have not been well addressed by the existing literature. One significant attempt to elucidate this is made by Homburg and colleagues (2010), which focuses on the impact of product elimination on customer relationships. They argued that product elimination causes severe psychological costs (e.g., doubt about the company's trustworthiness and flexibility) and economic costs (e.g., time and financial costs of searching for a substitute product) that result in customer dissatisfaction and customer churn. To

lessen the negative impact, firms should improve the perceived quality of the implementation process and outcome. For example, managers should engage customers in the elimination process by providing timely updates, explaining the reasons for the elimination, involving the customers in the process, and solving customers' hassles caused by the elimination.

However, on the other hand, the product portfolio presented to consumers is not solely determined by the brands themselves. Although manufacturers wish to enjoy economies of scale by massively distributing the products, retailers increasingly tailor their offerings to local tastes (Mantrala et al., 2009). The success of a product depends on the socio-demographics of the region, the competition among retailers within the category, and the store characteristics (Ailawadi et al., 2010). As a consequence, the product removal decision can also be initiated by retailers and is referred to as product delisting.

Academic research has focused on how consumers experience choice and whether reducing real selection can be done without negatively affecting customer perceptions. Studies have explored the potential mental strain and confusion caused by expanding the consumer's choice range and how it may impact purchasing behavior (Ailawadi & Keller, 2004). This "choice overload" view believes that excessive assortment will decrease purchase likelihood (Iyengar & Lepper, 2000), lead to decision dissatisfaction (Haynes, 2009), and make choice decisions more complicated and difficult (Fasolo et al., 2009). Researchers have attempted to explain the contradictory results with an inverted U-shaped relationship between assortment size and choice satisfaction. As the number of options increases, consumers are more likely to find one that meets their needs. However, once the number of options exceeds the optimal number, the costs of choosing rise faster than the benefits, making the decision more difficult (Reutskaja & Hogarth 2009; Shah & Wolford 2007). The research on consumers' choice aversion further explains the

asymmetric increases in costs and benefits when assortment size becomes excessive (Chernev, 2003; Chernev et al., 2015).

Prior research has addressed the antecedents of product delisting, such as motivating factors and constraints on decision-making. For example, a dominant retailer is likely to make strategic delisting decisions to only carry popular products (Dukes et al., 2014). By doing so, the rival retailer is induced to keep both popular and specialty products to earn a competitive advantage. However, the high cost of carrying larger assortment forces rival retailers to charge a higher price in order to maintain their profit, which results in relaxed price competition for the commonly carried popular products. Davies (1994) interview 125 buyers from large and small retailers and asked for the reasons behind 290 instances of product delisting. The criteria included low sales volume, gross profit margin, net profit margin, poor delivery, wrong price point, predicted sales in the future, price to retailer too high, price rise from supplier too high, and change of retailer strategy. In addition, retailer buyers with varying levels of experience differed in their evaluations of to-be-delisted products. Younger and less experienced buyers were more likely to delist because of low margins, while senior buyers considered the profits.

A product may also be delisted due to political motivations. For example, a retailer can threaten to delist a product for a better deal or as "punishment" (Gölgeci et al., 2021). Dobson et al. (2001) show that strong retailers will try to maximize margins by negotiating lower pricing or pressing suppliers to participate in store promotions. Small suppliers must comply, or face being delisted. In addition, a delisting can occur due to channel conflict, where the retailer refuses to carry the product if the manufacturer sells it directly to consumers. Levi Strauss, for instance, was forced to discontinue selling through its own website after distributors and retailers complained (Schoenbachler & Gordan, 2002). When a similar product, especially a private label product, is to

be launched, retailers may delist the current product to ease competition (Soberman & Parket, 2006). In the worst-case scenario, a retailer may delist all of the national-brand products and solely sell the private-label products. Lastly, delisting may happen at the store level due to assortment localization. Large retailers such as Walmart, Home Depot, Macy's, and Best Buy have been shown to modify their inventory at each location to accommodate local tastes (Fisher & Vaidyanathan, 2014).

The majority of studies (e.g., Boatwright & Nunes, 2001; Borle et al., 2005) look at the effects of delisting in the event of a permanent assortment reduction and evaluated the impact in terms of category and retail store sales as well as assortment perception among consumers. According to some research, delisting has no detrimental effects on sales or perceptions (Broniarczyk et al., 1998). Dreze and colleagues (1994), for instance, demonstrate that when 10% of the least popular products in a certain store were removed, overall sales increased by about 4%. However, consumer heterogeneity as well as how the reduction of items impacted the availability of alternative attributes such as brands and flavors in the category played an important role in predicting consumers' store switching intention (Boatwright & Nunes, 2001; Gazquez-Abad et al., 2021). These works, to some extent, explain the opposite results of the impact of assortment reduction in the literature. Sloot et al. (2006), for example, discover the negative sales consequences of assortment reduction. They argue that when customers are unable to locate the products they previously purchased, they have to postpone their purchases and choose between switching products or switching stores. As a result, assortment reduction could harm retailers' category sales and consumer store loyalty (Oppewal & Koelemeijer, 2005). The same evidence is found in the context of online grocery shopping. Borle et al. (2005) conduct a field experiment with an online grocer where 840 households experienced an assortment reduction of 24% to 91%

within a category and found that product reduction resulted in significant decreases in purchase quantity and amount. They suspect that the null effect observed in Boatwright and Nunes (2001) was because the categories tested in their study were mostly frequently purchased goods. Borle et al. (2005) confirm this hypothesis and suggest that the sales loss increases 2.23% on average with each additional day of category interpurchase time. Nevertheless, the effect of a single or small number of product delisting remains overlooked.

As shown in Table 2, the current body of literature acknowledges the importance of product removals in influencing firm performance and explores the strategic motivations underlying manufacturers' and retailers' decisions to remove products. However, this research is fragmented and lacks an integrated understanding of the interactions occurring within a channel. The first essay in this dissertation, "Rethinking Product Removal: A Dual-Perspective from Manufacturer and Retailer," investigates and compares the effects of product removal at the SKU (Stock Keeping Unit) level by distinguishing between two types of removals: those initiated by the manufacturer (referred to as product elimination) and those initiated by the retailer (referred to as product delisting). It is worth noting that existing literature often focuses on either one type or the other, but not both simultaneously.

Table 2-2: Summary of sample references in product removal literature

Sample Reference	Topic	Focus	Method	Parties involved
Avlonitis (1984)	Product elimination	Product elimination decision-making process	Interview and survey	Manufacturers
Alexander (1964)	Product elimination	Product elimination decision-making process	Conceptual	Manufacturers
Avlonitis (1983)	Product elimination	Product elimination implementation strategy	Interview and survey	Manufacturers
Hart (1988)	Product elimination	Product elimination cause	Interview and survey	Manufacturers
Bauer & Turčínková (2020)	Product elimination	Product elimination cause	Interview	Manufacturers
Avlonitis et al. (2000)	Product elimination	Product elimination cause	Survey	Manufacturers
Homburg et al. (2010)	Product elimination	Product elimination consequences	Survey	Manufacturers (B2B)
Dukes et al. (2009)	Product delisting	Reasons to delist (dominant retailer)	Theoretical	One manufacturer, two retailers
Davies (1994)	Product delisting	Reasons to delist	Interview	Retailers
Gölgeci et al. (2021)	Product delisting	Reasons to delist (manufacturer and retailer relationship)	Survey	Multiple manufacturers; One retailer
Boatwright & Nunes (2001)	Product delisting	Delisting consequences (assortment reduction)	Empirical	Multiple manufacturers; One retailer
Gazquez-Abad et al. (2021)	Product delisting	Moderators of Delisting consequences	Field Experiment	Multiple manufacturers; One retailer
Sloot et al. (2005)	Product delisting	Delisting consequences (assortment reduction)	Empirical	Multiple manufacturers; One retailer
Borle et al. (2005)	Product delisting	Delisting consequences (assortment reduction)	Natural Experiment	Multiple manufacturers; One retailer
Essay 1	Both	Product elimination and delisting consequences	Empirical	Multiple manufacturers; Multiple retailers

2.6.3 Lack of understanding of how the effectiveness of products' attribute innovation change over time with the dynamic interplay of retailers and manufacturers shaping the competitive dynamics

The above literature demonstrates that through assortment management, the leverage of private labels, or the delisting of products, retailers directly influence the sales performance of manufacturers' products. Retailers' product strategies may also indirectly influence the effectiveness of manufacturers' product strategies by shaping the competitive environment where the products are compared and purchased. This is similar to retailers' influence on manufacturers' pricing. They can directly exert their bargaining power to negotiate more favorable wholesale pricing and trade allowances (Buzzell et al., 1990), as well as indirectly affect manufacturers' earnings by influencing the level of price competition among manufacturers (Draganska & Klapper, 2007).

The competitive dynamics formed by manufacturers and retailers are one of the key drivers of consumer choice. The majority of research on competitive dynamics focuses on the competitors themselves. For instance, Villas-Boas (2006) discusses how manufacturers of experienced goods in a duopoly market set prices strategically in order to compete with each other. Other researchers are interested in the competition and dynamic pricing between multiple retailers (Yao & Liu, 2005). How retailers change the intensity of competition among manufacturers has been neglected. Draganska and Klapper (2007) suggest that retailer power influences the pricing intensity among the suppliers, and new suppliers must consider both competitors and the retail environment in the market.

The second essay fills in this gap by studying the role of retailers in shaping the competitive dynamics in the retail environment, which indirectly impact the effectiveness of a manufacturer's product design. We explore the effectiveness of a manufacturer's nutritional claims as a case in this study to demonstrate such impact.

Health-related attributes, in particular, have received considerable attention from managers, policymakers, and scholars. The global wellness market was estimated at over $1.5 trillion, with annual growth of 5 to 10 percent in 2021 (McKinsey & Company, 2021). Incorporating health-related attributes has become a necessity for companies to serve this market and differentiate themselves from the competition. Existing literature emphasizes consumers' responses or perceptions of health attributes (e.g., Ikonen et al., 2020; Ippolito & Mathios 1991; Van Trijp & Van der Lans, 2017; Verbeke et al., 2009; Roe et al. 1999) and finds mixed results. Health and nutrition claims are found to positively influence consumer attitudes and health inferences about the product (Aschemann-Witzel & Grunert, 2015; Kozup et al., 2003), as well as purchase intentions (Orquin & Scholderer, 2015). Less favorable responses may include consumer skepticism towards the label (Fenko et al., 2016; Garretson & Burton 2000), reduced taste perception (Bialkova et al., 2016), and confusion due to information overload (Benson et al., 2018).

While it is the manufacturers who design the products and add health benefits to the products, it is the retail environment that nudges the choice decision. Many nutrition labeling studies, according to Newman et al. (2016), simply take into account how consumers interpret health information for a specific food product (i.e., in a noncomparative processing context). Nonetheless, in more intricate purchasing settings, customers frequently compare and contrast a large number of food items simultaneously (i.e., in comparison processing contexts). Newman et al. (2014) show that although front-of-pack nutrient-focused labels and interpretive summary

labels have similar positive impacts on product evaluation in a single product condition, the latter is more effective in a realistic setting where multiple products are presented. The effect of size of these labels in experimental studies is also questioned as Dubois et al. (2021) reveal the best-performing label in their field experiment, Nutri-Score, only show a 2.5% improvement on the nutrition quality of shoppers' baskets. On the other hand, retailers also directly engage in healthier baskets through point-of-sale interventions, which entails the use of labels, posters, or other kinds of interactive methods such as tasting to highlight healthy products in the store (Escaron et al., 2013; Glanz & Yaroch, 2004). Nikolova and Inman (2015) empirically examine the sales effect of a retailer scoring system and show that consumers switch to products with higher scores and become less price-sensitive after the intervention.

The current literature also investigates various moderators on the effectiveness of nutrition labels including consumer heterogeneity (e.g. Nalyor et al. 2009), claim types (André et al., 2019), external advertising campaigns (Bolling et al., 2022), and product characteristics (Maesen et al., 2022). At firm-level, Cao and Yan (2016) find that the degree of nutritional emphasis and the specificity of claims have positive impacts on firm value and sales, whereas the depth of claims has negative impacts. However, empirical evidence in the literature on the influence of the retail environment on the sales effectiveness of a nutritionally emphasized product design is limited. After all, all purchases are made at a retail store, marking the beginning of both one's best and worst eating habits (Wansink, 2017). Cameron et al. (2016) categorize retail innovations in promoting healthier choices into the "4Ps": expanded healthy product alternatives (product), healthy product promotion via strategies such as shelf labeling or taste testing (promotion), improved store presentation (place), and discounts or subsidies (price). Seventy percent of the 50 studies included in the paper find that these interventions have a positive effect on encouraging

healthier consumption, underscoring the importance of retail marketing in influencing customers' eating habits. In-store marketing initiatives help boost the availability, affordability, visibility, and promotion of healthy options, resulting in a healthier shopping basket (Glanz et al., 2012). Yet, no literature has investigated the moderating effects of retailer strategy on the effectiveness of manufacturers' health attribute design.

In summary, existing research emphasizes the direct influence of retailers on manufacturers' prices and product management while overlooking their indirect role in fostering a competitive environment through various retail strategies (suggested in Table 2-3). Using an example of the efficacy of health attributes, the second essay in this dissertation, "The Time-varying Effects of Nutrition Claims on Product Sales and Its Drivers," closes this gap. The bulk of the literature on nutrition and health claims fails to account for the indirect role of retailers in influencing the effectiveness of these claims.

Table 2-3: Summary of sample marketing literature in nutrition/health labels

Sample Reference in marketing	Dependent variable	Moderators	Method	Retailers' involvement
Roe et al. (1999)	Consumer evaluation	N/A	Experiment	N/A
Garretson & Burton (2000)	Consumer perception	N/A	Experiment	N/A
Ippolito & Mathiod (1991)	Consumer knowledge	N/A	Survey	N/A
Kozup et al (2003)	Consumer attitude	N/A	Experiment	N/A
Nikolova & Inman (2015)	Consumer purchase	N/A	Field experiment	Initiator of the nutrition label
Newman et al. (2014)	Retailer perceptions	N/A	Experiment	Experiment Context
Dubois et al. (2021)	Sales	N/A	Field experiment	Experiment Context
André et al. (2019)	Consumer perception	Types of claims	Survey and Experiment	N/A
Newman et al (2016)	Consumer evaluation and purchase intention	Shopping Context	Experiment	Experiment Context
Nalyor et al. (2009)	Choice likelihood	Consumer health consciousness	Experiment	N/A
Bollinger et al. (2022)	Purchase	Educational advertising campaign	Field experiment	Initiator of the nutrition label

Maesen et al. (2022)	Sales	Product characteristics	Empirical	N/A
Cao & Yan (2016)	Firm value	Claim depth, specificity and degree of nutritional emphasis	Empirical	N/A
Essay 2	**Sales**	**Market Presence and marketing strategy in the retail store**	**Empirical**	Research Context

3. Essay 1 - Rethinking Product Removal: A Dual-Perspective from Manufacturer and Retailer

Abstract

Consumers often encounter situations where products they previously purchased—and expect to buy again—are permanently withdrawn from the shelves of their preferred retailer. Often, they assume that the manufacturer has removed the product from its portfolio entirely, a process referred to as product *elimination*, only to then discover that the product is still available in a different store. In such cases, the product has been *delisted* by one retailer but not by others. Previous literature on product removal has focused on either elimination or delisting as separate processes. By contrast, the present study describes a dual perspective to compare the impacts of product *elimination* and product *delisting* on brand performance, which helps to enrich the understanding of the role of distributors on the removal process. Overall, product elimination shows an insignificant effect, while product delisting has a significant negative effect. That negative effect is stronger for heavy users of the removed products, but can be overcome by maintaining a differentiated portfolio from competitors. These results are expected to be of direct utility for brand and portfolio management.

Keywords: Product Removal, Product Delisting, Product Elimination, Brand Differentiation

Introduction

Every year, roughly 30,000 new products burst onto the Consumer Packaged Goods (CPG) market (Nielsen ID 2019). Given the limited shelf space available in retail stores, some older products are inevitably removed to make way for these new arrivals. And while a great deal of marketing research deals with product innovation (e.g., Ma et al., 2015), there has been comparatively little examination and discussion of product removal. Core questions remain unanswered or only partially explored: What are the different types of product removal? Does product removal benefit or hurt a brand? How do retailers impact product removal? Greater understanding of these and related issues is required to help firms prevent potential negative outcomes on brands.

When consumers find that a familiar product has disappeared from shelves, they usually assume that the manufacturer ended production and eliminated the product from its portfolio. Often, that is exactly what has happened; Procter & Gamble (P&G), for instance, regularly refine their product lines in an effort to retain only the strongest products (Ng 2014). Snyder's-Lance, Inc., the second largest salty snack maker in the United States, dropped over 700 SKUs that were identified as generating minimal revenue. Withdrawing them thus had a positive effect on operation income (Guszkowski, 2017). This process has classically been referred to as "product elimination" in the marketing literature, since at least the 1990s. Avlonitis and Argouslidis (2012) reviewed 66 papers from the four decades between 1970 and 2010 in marketing and economics journals. They found that product elimination theory has its origins in the product management literature, but that the amount of research in this area is still limited compared to related areas such as new product development. Discussion of product elimination focuses primarily on procedures

for decision-making around which product lines to terminate (e.g. McSurely & Wilemon, 1973), the rules of organizational participation in product elimination (Kratchman et al., 1975), and the factors that correlate with product deletion propensity (Varadarajan et al., 2006). They conclude that assessing the success or failure of product elimination decisions has been particularly understudied. In addition, the literature is built upon the assumption that product removals are initiated by manufacturers, which is not always the case.

While manufacturers do play a role in product elimination when they choose to terminate production, many products are permanently removed from shelves due instead to retailers' inventory management. We describe this type of removal as "product delisting," where the product is withdrawn in one chain or location but remains available in others. We observe in our data that more than half of all documented product removals were cases of product delisting rather than manufacturer-originated elimination. The origins of delisting are historical: as giant retail chains such as Walmart started to expand rapidly to a global scale, manufacturers no longer maintained full control over product removal. Retailers have enforced a range of restraints on suppliers: exclusive supply, minimum supply levels, minimum advertising requirements, and some even threaten to delist products as a negotiating tactic (Ailawadi et al., 2010; Kadiyali, Chintagunta & Vilcassim, 2000). For example, Costco delisted all products from Coca-Cola Company in 2010 due to a price conflict (Ritson, 2010). Battles for product placement exist in the online environment as well, with Amazon delisting books published by Hachette in order to negotiate better e-book rates (Luckerson, 2014). Such battles have attracted some attention from policymakers, resulting in an emerging field of regulation for delisting. The Groceries Supply Code of Practice in the UK, for instance, established a set of obligations for retailers: to fairly delist products and to inform manufacturers prior to delisting (Gov.UK, 2009). However, despite the power retailers wield,

research has focused primarily on the consequences they face (e.g., Sloot et al., 2006) rather than examining the harmful effects of product removal on manufacturers.

To help fill these gaps in the product removal literature, this article introduces a dual perspective on product removal, where we distinguish between removals driven by manufacturers and removals driven by retailers and examine the differing effects these two processes can have on brands. More specifically, we ask:

(1) How do product elimination and product delisting impact brands differentially?

(2) Do consumer heterogeneity and product characteristics moderate the effects of product elimination or delisting?

To address these questions empirically, we conducted aggregate and individual-level analysis using the NielsenIQ retail scanner and panel data for the yogurt product category. Yogurt sales have seen rapid growth in the United States over the last 10 years, with the average purchase increasing from 6.5 pounds per person in 2000 to 13.7 pounds in 2016 (Statista, 2020). The annual rate of new product introductions increased by 9.3% between 2012 and 2017 (McDonald, 2017), creating a high rate of continuous change in the product category that allowed us to compile an expansive list of product eliminations and delistings.

Our work was conducted as three separate studies. The first study (Study 1) used aggregate-level store data to investigate the effects of product delisting and product eliminations on brand sales. We find that product elimination does not change brand performance, while product delisting has a substantial negative impact. The second study (Study 2) confirms the results in Study 1 at individual level with panel data. The effects are robust after controlling for consumer heterogeneity.

Our third study (Study 3) utilized a difference-in-differences model, where we created a set of households matched on all available traits except whether or not they had experienced

elimination and/or delisting for a particular brand, and then compared the changes in brand spending before and after product elimination/delisting events. Consistent with the results of Study 1 and Study 2, we find a negative and significant effect of product delisting on brand purchases, but an insignificant effect for product elimination. The negative impact of delisting was stronger for consumers who had previously purchased more of the removed SKU. On average, product delisting led to a 23% sales loss for the brand whose SKU was delisted and a corresponding 19% sales increase for competing brands in the same store. In addition, product differentiation mitigates the impact of product delisting. Within-brand similarity and across-brand dissimilarity help retain consumers after a delisting event and defend market share for the brand in question.

The rest of this article presents the conceptual and empirical background for the research we report, then describes model specifications and the results of our three studies, and concludes with a general discussion of our results to offer additional context and commentary.

Research Background

Product Unavailability

Product removal of any type sits in the same domain of corporate decision-making, marketing research, and consumer behavior as the broader phenomenon of product unavailability. Past research has differentiated four types of product unavailability: out-of-stock (OOS), permanent assortment reduction, conflict delisting, and brand delisting (Breugelmans et al., 2018). While product removal bears some resemblance to each of these, neither consumer responses nor strategic considerations for brands are identical across any of these cases, due to the significant differences among these product unavailability types. The four types of product unavailability can

be compared to product removal on the dimensions of scope, time scan, frequency, drivers, initiator, and planning status (Table 1).

Table 3-1 Comparison of Product Unavailability Types

	Out-of-Stock	**Permanent Assortment Reduction**	**Brand Delisting**	**Conflict Delisting**	**Product Removal**
Scope	Narrow	Narrow	Broad	Broad	Narrow
Time span	Temporary	Permanent	Permanent	Temporary	Permanent
Frequency	High	Low	Low	Low	Medium
Driver	Inventory shortage	Assortment Management	Retailer-manufacturer battle	Retailer-manufacturer battle	Elimination/Delisting
Initiator	/	Retailer	Retailer/manufacturer	Retailer/manufacturer	Retailer/manufacturer
Plan	Not planned	Planned	Planned	Planned	Planned
References	Che, Chen and Chen (2012); Jing and Lewis (2011);	Oppewal and Koelemeijer (2005); Sloot et al. (2006);	Sloot and Verhoef (2008); Wiebach and Hildebrandt (2012)	Van der Maelen, Breugelmans and Cleeren (2017)	N/A (present study fills this gap)

Among the varieties of product unavailability, the most similar to product removal is permanent assortment reduction. Both are narrow in scope, have a permanent time span, and are likely to be planned prior to execution. However, product removal decisions are typically made at the SKU level and see no significant change in category size, meaning they occur more frequently than permanent assortment reduction. OOS scenarios also operate at the SKU level, but are temporary and occur more frequently than product removals. Given that OOS products tend to be back in stock within 1-2 days, the impact of out-of-stock items is mostly short-term. Brand delisting and conflict delisting involve the unavailability of the entire brand, meaning that consumers are not able to switch to another same-brand item, leading to a significant loss of sales. Although some consumers will switch stores to purchase the desired brand, no mitigation is possible with store-loyal consumers.

The present study contributes to the product unavailability literature by highlighting the unique features of product removal and its impact on consumer brand responses. In the next section,

we elaborate on the conceptual status of product removal, the primary findings from prior research, and the dual perspective that characterizes those research efforts.

Product Removal

The literature on product removal can be grouped by which of two perspectives each study adopts. The earliest discussions on the topic were concerned with theorizing decision-making processes for manufacturers or service providers considering product elimination (e.g. Argouslidis & Baltas, 2007; Avlonitis et al., 2000). This body of work suggests multiple stages that firms should undergo before finalizing their product elimination decisions. These stages include detecting weak products, cause evaluation, improvement plans, and projection of elimination impact (Browne & Kemp, 1976).

Complementary empirical research includes studies that document companies' product elimination practices through in-depth interviews or surveys (e.g., Argouslidis & McLean, 2001). This research can be broadly split into three streams. The first stream focuses on the pre-elimination decision phase during which firms set their objectives when initiating product elimination (e.g. Argouslidis & McLean, 2001; Hart, 1988), or describes different contexts that can trigger a company's engagement in product elimination (e.g. Harness & Marr, 2004). The second stream studies the product elimination process itself, and confirms that elimination decisions are usually multi-stage—if not quite as rigid as conceptual papers suggest. Sector, firm, product, and external context determine the intensity of the consideration, research, and planning involved in each stage (Avlontis & Argouslidis, 2012). The third and final stream of research questions the organizational and structural characteristics of product elimination decision-making, such as degree of formalization (Argouslidis & Baltas, 2007) and decision speed (Argouslidis,

2008). Successful elimination is related to strategic decision-making, systematizing elimination behaviors, and forming multi-departmental teams (Gounaris et al., 2006).

One major concern not well-addressed by the extant literature in marketing is the consequences of product elimination. One significant attempt to elucidate these was made by Homburg and colleagues (2010), who explored the extent to which product elimination negatively affected customer satisfaction and loyalty. They argued that product elimination may cause severe economic and psychological costs that disappoint customers in B2B contexts. The present study builds on their work by extending a similar set of questions to B2C contexts, and by engaging in a more granular breakdown of product removal types and outcomes.

A second perspective arose in the late 1990s as focus began shifting toward retailers. The increasing power of retail chains had weakened manufacturers' control over product listings, making retail-centric perspectives more important. At the same time, intense competition between national brands and retail chains brands pushed retailers to enforce multiple constraints on suppliers, in some cases even threatening to delist products in order to negotiate a better price (Ailawadi et al., 2010; Kadiyali et al., 2000). We have labeled this second type of product removal, in which retailers play a central important role in the removal decision, as product delisting. We define product delisting as a process whereby a product is permanently removed from one or more retail stores while remaining available in other locations or at other store chains.

Prior research has addressed several aspects of product delisting, including motivating factors and constraints on decision-making. For example, a dominant retailer is likely to make strategic delist decisions in order to cause a rival retailer to bear the cost of carrying a larger assortment (Dukes et al., 2009). Retailer buyers with varying levels of experience differ in their evaluations of to-be-delisted products (Davies, 1994). Younger and less experienced buyers are

more likely to delist because of low margins, while senior buyers consider beyond the profits. Most research examines the consequences of delisting in the case of permanent assortment reduction and assesses the impact in terms of category and retail store sales and assortment perception among consumers (e.g., Boatwright & Nunes, 2001; Borle et al., 2005). Some studies found that delisting did not negatively affect perceptions or sales (Broniarczyk et al., 1998). For example, Dreze and colleagues (1994) show that aggregate sales went up nearly 4% after removing 10% of the least popular products in a given store. However, the impact of single or small amount of product delistings has been overlooked.

Table 2 summarizes the focus and findings of the current single-perspective literature on product removal. From the manufacturer-only perspective, the assessment of product elimination results has been scarce, and the critical role of retailers has been neglected. From the retailer-only perspective, very little attention has been paid to how brands are impacted or how they should react to delistings and eliminations. We thus propose a dual-perspective approach to the study of product removal, one that compares and differentiates the impact of elimination and delisting and provides mitigation strategies for brands undergoing product removal.

Table 3-2 Summaries of Single Perspective Research on Product Removal

Perspective	Focus	Key Findings
Manufacturer / Elimination	Why	Factors including external environment (policy, exchange rate), internal evolution (competition, new product development) (Hart 1988).
	How	Implementing strategic decision making, adopting systematic elimination behavior, and forming multi-departmental teams (Gounaris et al. 2006).
	Consequences	Negative effect on customer satisfaction and loyalty in B2B context (Homburg et al 2010).
Retailer / Delisting	Why	Delisting as dominant retailers' strategic decision (Dukes et al. 2009)
	How	Keeping consumers' favorite brands to prevent store switching (Gazquez-Abad et al. 2021)
	Consequences	No negative effect on perceptions and sales (Broniarczyk et al. 1998)

The impact of product removals

The impact of product removal on brand performance depends on product popularity, within- and between-category product diversity, and a range of other factors. This complexity is why firms considering product elimination typically undergo a multi-stage formal process to determine the potential impact on consumer perception and behavior (e.g. Gounaris et al., 2006). Wilson and Perumal (2009) conclude that significant increases in SKU portfolio size can result in operation costs being raised by 15% to 30% while only 20% to 30% of the products are profitable. These figures were recently supported by a report from PricewaterhouseCoopers (PwC), which estimated that about 35% of its SKUs drive zero incremental profitability (PwC, 2019). Similarly, Nielsen IQ (2021) reported that reducing a firm's quantity of SKUs by between 10% and 20% can lead cost reductions of up to 10% across production, supply chain, and inventory as well as up to 5% savings on raw materials and packaging. Other potential benefits of strategic product delisting include increased average speed to market, shelf availability improvement, and boosted customer satisfaction (Adams et al., 2016). Mondelez, Procter & Gamble, and Coca-Cola have all recently announced plans to focus on their most important SKUs in order to simplify supply chains and improve efficiency (Cosgrove, 2020).

From the consumer perspective, product variety is only positive up to a point. Greater variety can be associated with increased brand performance (Berger et al 2007), but managing excessive product variations degrades customer service (Closs et al., 2010). Wan et al. (2012) reported similar findings, and also reported that as service levels fall due to high levels of complexity, sales decrease significantly. Product elimination can be a solution to excessive variability, while simultaneously enabling brands to reallocate resources to other product lines or product innovations (Gilliland, 2011; Muir & Reynolds, 2011). It redirects operational and

managerial efforts—and consumer attention—to more financially rewarding activities, directly improving competitive positioning (Harness & Harness, 2012). For all these reasons, according to both industry reports and academic research, product removal initiated by the manufacturer should have a positive consequence on brand performance. We thus hypothesized that we would observe the following pattern in our studies of purchasing behavior:

H_1: Product elimination positively influences brand sales.

In contrast, product delisting—removal that is outside manufacturers' control—bears greater similarity to OOS assortment reduction scenarios. This conclusion is supported by prior research. For instance, using individual purchase data, Jing and Lewis (2011) found that although stockout increases future buying in the short-term, cumulative stockouts, which create an overall effect similar to product delisting, ultimately diminish customer retention. OOS also damages sales for other items in the same category (Kalyanam et al., 2007) and such damage increases exponentially with the total number of unavailable products (Musalem et al., 2010). Category reduction has been found to produce a similar negative effect, as it creates essentially the same situation where some buyers are no longer able to find the product they used to purchase (Sloot et al., 2005). These buyers will have to postpone their purchases, causing immediate brand sales loss, and must later decide between switching products (within or outside the brand) or switching stores (Campo et al., 2000, 2004; Sloot et al., 2006).

These negative effects on brands reflect the fact that product delisting decisions are made to protect the interests of retailers. For example, retailers may delist some or all of a brand's products if their pricing demands are not met (Bloom & Perry, 2001), or simply to benefit their own private labels (Steenkamp & Dekimpe, 1997; Steiner, 2004). According to Dukes and colleagues (2009), a dominant retailer may strategically delist products to pass the cost of

purchasing them on to competitors, thereby achieving cost leadership. Consumers' perceptions of the delisted brand are ignored in this process; the substitute products provided by the retailer are likely to be from competing brands or store brands. Based on these findings, we hypothesized that:

H_2: Product delisting negatively influences brand sales.

Moderators of the product removal effect

Consumers' reactions to product unavailability vary based on the nature of the available substitute products (Wan et al., 2012). When acceptable alternatives are available, consumers tend to choose another SKU rather than purchase their preferred SKU from another store (Campo et al., 2000). In these situations, brand share is retained when consumers find a substitute within the brand's portfolio and lost when a better substitute is offered by competitors. When a preferred product is not available, consumers are inclined to choose a similar alternative that shares common attributes with it rather than a dissimilar alternative (Ratneshwar & Shocker, 1991). The concept of substitution selection employed by these studies is related to the concept of a consideration set; both involve the evaluation of competing alternatives capable of meeting the same need or fulfilling the same desire. Consistent with substitution theory, consideration sets are made of similar alternatives (Arens & Hamilton, 2018).

If similar alternatives exist only within the range of products offered by a single brand, consumers are less likely to switch to another brand. This is one reason by brand differentiation results in greater long-term success (Mizik & Jacobson, 2008), and part of why it has been documented as the key strategy for maintaining long-term market share in many top brand management guides (Aaker, 2011). Thus, we predicted that:

H_3: Within (Across) brand similarity strengthens (diminishes) the positive effect of product elimination.

H_4: Within (Across) brand similarity mitigates (worsens) the negative effect of product delisting.

The effect of product removal is also related to customers' pre-existing relationship with the product in question. The heterogeneity of consumer preferences is a major driver of retailers' assortment and inventory decisions, as well as the substitution patterns that emerge when a product becomes unavailable (Anupindi et al., 2009). For example, Fitzsimons (2000) found that product unavailability decreases customer satisfaction more when customers include the item in, versus exclude it from, their consideration set. Campo et al. (2004) argue that from a cost perspective, item loyalty induces higher substitution and search costs when the product is unavailable. Substitution costs arise from utility differences between the unavailable product and the alternative item, while search costs increase when consumers lack sufficient knowledge about available alternatives. In sum, if a consumer has established a strong preference for a particular product, that product becoming unavailable leads to a more exhausting purchasing decision process and less satisfaction with the brand overall. The opposite is true for unfamiliar products, with a product that has never been purchased before having a low likelihood of being chosen for purchase, meaning the presence or absence of the product has only a negligible impact. These considerations led us to hypothesize that past usage would moderate the product removal effects for both product delisting and elimination:

H_5: The positive impact of product elimination on brand's sales is weaker for heavy users of the removed product.

H_6: The negative impact of product delisting on brand's sales is stronger for heavy users of the removed product.

Study 1: *Scanner Data Analysis*

Our first study uses store sales data to test H1 and H2. We examine how brand sales are influenced by the number of delistings and eliminations. Figure 1 illustrates our conceptual framework in study 1. We use scanner data to identify delistings and eliminations then count the total number of delistings and eliminations for each brand. We model brand baseline sales as a function of the number of product delistings and eliminations with product introductions as a control variable (Figure 1).

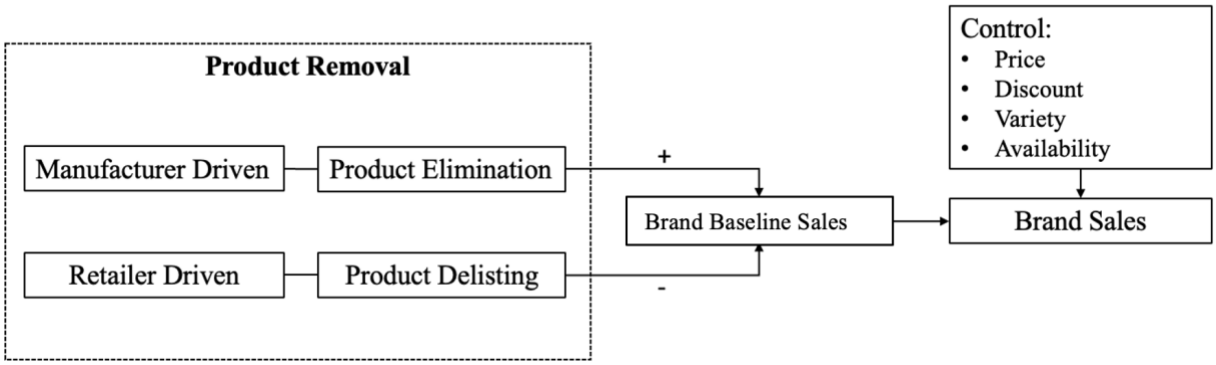

Figure 3-1: Conceptual Framework in Study 1

Model

To start, we model brand sales as a function of marketing strategies including price, discount, availability, and variety:

$$(1) \quad SALES_{krt} = \gamma_{krt} + \alpha_1 Price_{krt} + \alpha_2 Disc_{krt} + \alpha_3 Avai_{krt} + \alpha_4 Vari_{krt} +$$

$$\delta_1 Copular\_Price_{krt} + \delta_2 Copular\_Disc_{krt} + \delta_3 Copular\_Avai_{krt} + \delta_4 Copular\_Vari_{krt}$$

$$\delta_5 Copular\_Intro_{krt} + \delta_6 Copular\_Elim_{krt} + \delta_7 Copular\_Delist_{krt} + w_{krt}$$

Where *k, r, t* stand for the brand, retailer, and time of the observation respectively. The dependent variable is the log-transform of unit sales of brand *k* in retailer *r* at time *t*. γ is a time-varying intercept the captures brand baseline sales. *Price* is the log transform of price in cents per ounce. *Disc* is the log transform of percentage of discounted products of brand *k*. *Avai* captures the availability which is the log transform of total number of stores carrying the brand. Lastly, *Vari* is the log transform of variety of SKU to control for assortment size and shelf space. *w* is the error term with a multivariant normal distribution and store clustered variance. The coefficients α_1 to α_4 represent the effect of price, discount, store availability and variety. Similarly to Ataman, Van Heerde and Mela (2010), we standardize the variables to control for unobserved fixed effects. We control for endogeneity of marketing variables and product introduction, elimination and delisting decisions with the Gaussian Copula terms. This approach explicitly models the joint distribution of the error term and the possibly endogenous regressors (Park and Gupta 2012). The Gaussian Copula approach assumes that the endogenous regressors be not normally distributed. We rejected the normality for all seven variables ($p < 0.1$) with the Shapiro-Wilk tests following Datta et al. (2017).

Next, to test our hypotheses, we model baseline sales as a function of product delisting, elimination and introduction. The state equation is specified as follows:

$$\gamma_{krt} = \lambda\, \gamma_{krt-1} + \theta_1 \mathrm{Intro}_{krt} + \theta_2 \mathrm{Elim}_{krt} + \theta_3 \mathrm{Delist}_{krt} + v_{krt} \quad (2)$$

In equation 2, λ represents the carry-over effect of baseline sales. *Intro, Delist* and *Elim* represent the log transform of the total number of product introductions, eliminations and delistings at time *t*, respectively. Because we control for assortment size and shelf space in equation 1, θ_1 to θ_3 measure the pure effects of introduction, elimination and delisting. We expect the θ_1 to be positive because prior research shows that product innovations improve brand value (Srinivasan

et al. 2009) and attitudes (Aaker and Jacobson 2001). Our hypothesis 1 and 2 predicts the coefficient of product elimination (θ_2) will be positive and the coefficient of delisting (θ_3) will be negative. Again, we standardize the independent variables to allow the parameters to capture the time-varying marketing activities. We assume *v* is independently distributed for each timer series.

Data and Measurements

We use NielsenIQ retail scanner in the yogurt category from 2015 to 2018. The four-year window of observation allows us to capture the variation in product removal. To have a manageable size of observations, we focus on three districts with the highest level of competition among retailers. The competitive environment helps us to identify product delisting and elimination. Following Ataman et al. (2010), we aggregate the sales data for stores of the same retailer in the same district, as the marketing activities are similar for these stores. We gave each retailer-district a new id and refer to them as different "stores". Lastly, to reduce the impact of sales shocks such as out-of-stock events (Sriram, Balachander and Kalwani 2007), we aggregate the data into monthly units. Our final dataset includes a total of 3,358 observations across 13 brands, 15 stores, and 46 months.

Our dependent variable is the brand sales in units. *Price* is the log transform of sales-weighted average price per unit (total dollars sales divided by total unit sales). Because the data does not provide indicators of price promotions, we define *discount* as when the net price is more than 5% lower than the maximum price paid in the previous four weeks and the following four weeks (Ailawadi et al., 2005). Then, we derive *discount* as the log transform of average number of products with a discount. We measure *availability* by the log transform of total number of stores carrying the brand k and *variety* as the total number of SKUs for brand k. *Introduction* is measured by the log transform of total number of products that are new in the store.

Next, we discuss the operationalization of the product removal variables. We define a product as being removed when the last observed sales at the store were at least one month before the end of the observation window. If a product is removed from some retailer(s) but not all, we classify it as a product delisting event. When a product disappeared in all observed retailers, we classify it as a product elimination event. Because stores may still have existing inventory after the manufacturer ceases production, we allow a one-month window when defining the product elimination event.

For example, a product disappeared from store A on 2015-12-27, and from store B on 2016-02-06 (A and B are in the same market/district) and its last appearance date in the market was also 2016-02-06. The product will be coded as a product delisting at store A, and as a product elimination in store B. Or, in a case where a product disappeared from store A on 2015-01-04 and from store B on 2015-01-24, because the product was removed from both stores within one month, it would be defined as product elimination for both store A and B.

Next, we sum up the total number of product delistings and eliminations for each store as our key independent variables in the state equation. Sometimes manufacturers slightly adjust the formula or packaging and use a different UPC number for the same product. We examine products' attributes and drop such cases when we calculate delisting and elimination. Table 3 lists our data operationalizations.

Table 3-3: Data Operationalizations in Study 1

	Variable	Operationalization
Observation Equation	Price	Log transform of sales weighted price in cents per oz
	Disc	Log transform of the average percentage of products that are on discount
	Avai	Log transform of the total number of stores carrying a brand
	Vari	Log transform of the total number of SKUs the brand has
State Equation	Intro	Log transform of the total number of new SKUs
	Elim	Log transform of the total number of SKUs that disappear completely in the market after one month

	Delist	Log transform of the total number of SKUs that disappear in store k but still exist in other store in the same market after one month

Table 4 summarises the number of Introductions, Eliminations, Delistings and Variety per month per store in our data. For example, brand A, with the highest share had 0.47 cases of product eliminations, 0.56 cases of product delistings and 1.16 cases of product introductions per month per store. We see larger brands (higher share and larger portfolio) have more products removed or introduced than smaller brands. This pattern is confirmed by the positive correlation between Variety, Introduction, Delisting, and Elimination as shown in Table 5.

Table 3-4: Comparison of Removal and Introductions by Brand

Brand	Introduction	Delisting	Elimination	Variety	Market Share
A	1.16	0.56	0.47	62	19.72%
B	1.09	0.51	0.31	40	17.13%
C	1.48	1.13	0.67	58	13.45%
D	0.41	0.27	0.09	19	7.04%
E	0.50	0.17	0.08	14	2.66%
F	0.23	0.11	0.10	7	2.39%
G	0.39	0.27	0.21	12	1.76%
H	0.17	0.11	0.21	6	1.18%
I	0.18	0.07	0.05	7	1.01%
J	0.13	0.09	0.09	5	0.46%
K	0.11	0.02	0.11	3	0.23%
L	0.14	0.06	0.07	4	0.18%
M	0.26	0.02	0.26	10	0.18%

*Introduction, delisting, elimination and variety are calculated as average per month per store

Table 3-5: Correlations and descriptive statistics of variables

Variables	1	2	3	4	5	6	7
1. Price	1						
2. Disc	-0.12	1					
3. Avai	0.08	0.11	1				
4. Vari	-0.36	0.32	-0.03	1			
5. Intro	-0.11	0.11	-0.02	0.30	1		
6. Elim	-0.20	0.07	0.00	0.30	0.29	1	
7. Delist	-0.17	0.08	-0.05	0.34	0.32	0.34	1
Summary Statistics							
Mean	-1.63	-1.30	2.07	2.76	-3.56	-3.91	-3.68
SD	0.30	1.03	0.90	1.12	2.19	1.76	1.99

Min	-2.47	-4.61	0.01	0.01	-4.61	-4.61	-4.61
Max	-0.73	0.01	4.04	4.78	2.94	2.89	3.14

Results

Table 6 shows the estimation results. Similar to what is reported in the existing literature (e.g. Ataman et al., 2010), we find a significant negative and significant effect of price (α_1 = -0.388, 95%CI [-0.601,-0.175]) and significant positive effects of discount (α_2 = 0.112, 95%CI [0.049,0.176]), availability (α_3 = 0.252, 95%CI [0.152,0.353]), and variety (α_4 = 0.176, 95%CI [0.136,0.216]) from the observation equation. These results are intuitive and demonstrate the face validity of the model.

Table 3-6: The Impact of Product Introduction and Removal on Brand Sales

	Variables	Coef	SE	95% CI	
Sales Equation	Price	-0.388	0.109	-0.601	-0.175
	Disc	0.112	0.033	0.049	0.176
	Avai	0.252	0.051	0.152	0.353
	Vari	0.176	0.020	0.136	0.216
State Equation	Lag	0.909	0.013	0.884	0.933
	Intro	0.015	0.013	-0.010	0.040
	Elim	0.005	0.011	-0.017	0.027
	Delist	-0.022	0.011	-0.044	-0.001

*N=3358

For the state equation, we first identify a strong carry-over effect of baseline sales (λ= 0.908, 95%CI [0.884,0.933]). This is as expected for convenience goods like yogurt (Ataman et al., 2008). We also find a positive but insignificant effect of product introduction (θ_1 = 0.015, 95%CI [-0.010,0.040]). This is directionally consistent with the research in product innovation which shows that the success of new products secures competitive advantage (Brexendorf et al., 2015), improve brand value (Srinivasan et al., 2009) and attitudes (Aaker and Jacobson, 2001).

The insignificance might be driven by unsuccessful product launches, especially for small brands (Nielsen ID, 2019).

There is no significant positive impact of product elimination (θ_3 = 0.005, 95%CI [-0.017,0.027]), which rejects our Hypothesis 1. Hypothesis 2 is supported with a negatively significant impact of product delisting (θ_2 = -0.022, 95%CI [-0.044,-0.001]). The results show that product delisting will decrease baseline sales after controlling for variety and introductions, but product elimination has no effect on improving baseline sales.

Following Ataman et al. (2008), we assess the model by comparing our model (M0) with two alternative models. In the first model (M1), baseline sales are assumed to be constant, that is $\gamma_{kst} = \theta_1 \text{Intro}_{kst} + \theta_2 \text{Delist}_{kst} + \theta_3 \text{Elim}_{kst} + v_{kst}$. The second model (M2) assumes that the baseline sales is dynamic but independent of introduction, delist and elimination. That is $\gamma_{kst} = \lambda\, \gamma_{kst-1} + v_{kst}$. The assessment results suggest that our model outperforms these benchmark models (AIC_{m0} = 7177; AIC_{m1} = 8575; AIC_{m2}=7272).

Study 2: Panel Data Analysis

In the second study, we use household level purchase to data to further validate H1 and H2. We use a random effect Tobit model, where the dependent variable, brand spending is left-bounded by 0. Comparing to Study 1, Study 2 allows us to control on more variables such as household characteristics. Figure 2 illustrates the conceptual framework in study 2.

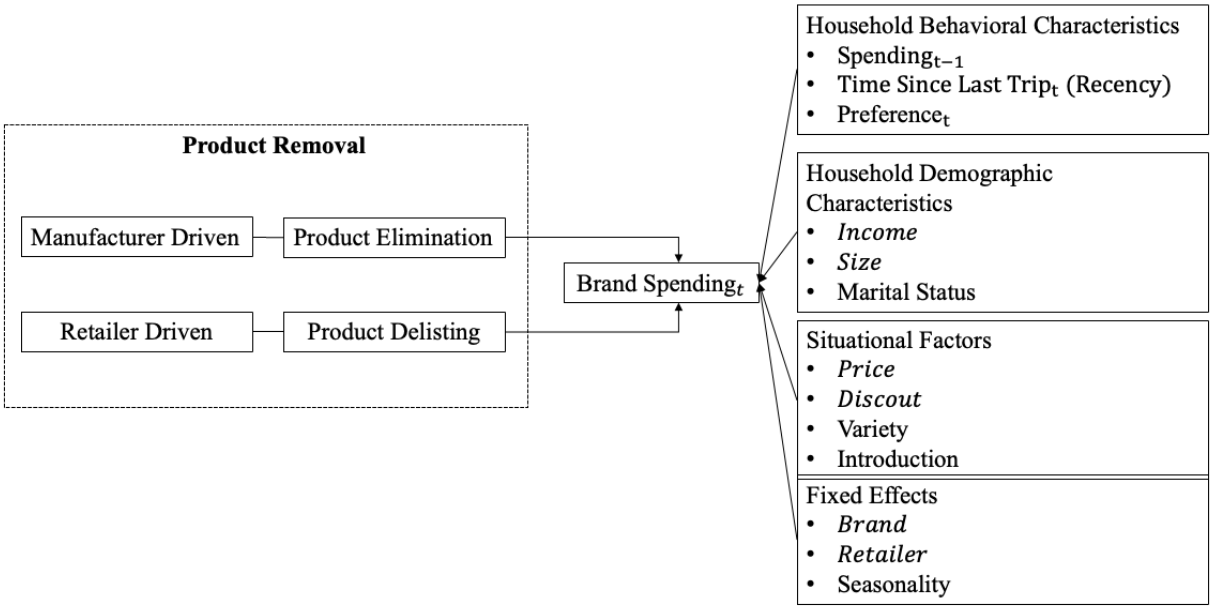

Figure 3-2: Conceptual Framework in Study 2

Model

The dependent variable in study 2 is the log-transform of household i's spending on focal brand *k* in store *s* at month *t*. *lnSpending$_{t-1}$* is the log transform of unit spending in household's previous trip of brand k in store s, which controls for inventory. *Time_since_last trip* controls for the inter-purchase time which is the time since household's last trip in store s. *Brand Preference* is the log transformed unit spending of the focal brand one year before. The situational variables, price, discount and variety, are coded in the same way as study 1. *Price* is the log transform of price in cents per ounce. *Disc* is the log transform of percentage of discounted products of brand *k*. *Avai* captures the availability which is the log transform of total number of stores carrying the brand. *Vari* is the log transform of variety of SKU to control for assortment size and shelf space.

$$(3)\ \ln\text{Spending}_{ikst} = \gamma_{ikst} + \alpha_1 \ln\text{Spending}_{ikst-1} + \alpha_2 \text{Time since last trip}_{ikst} + \alpha_3 \text{Brand Preference}_{ikst} +$$

$$\alpha_4 \text{Log Price}_{ikst} + \text{Discount}_{ikst} + \alpha_6 \text{Variety}_{ikst} + \alpha_7 \text{Delist}_{ikst} + \alpha_8 \text{Elimination}_{ikst}$$
$$+ \alpha_9 \text{Intro}_{ikst} + \alpha_{10} \text{Brand}_{ikst} + \alpha_{11} \text{Retailer}_{ikst} + \alpha_{12} \text{Seasonality}_{ikst}$$
$$+ \alpha_{13} \text{Income}_{ikst} + \alpha_{14} \text{Size}_{ikst} + \alpha_{15} \text{MaritalStatus}_{ikst} + \lambda_1 \text{Copula}_{ikst}^{\text{Delist}} + \lambda_2 \text{Copula}_{ikst}^{\text{Elimination}}$$
$$+ \lambda_3 \text{Copula}_{ikst}^{\text{Intro}} + \lambda_4 \text{Copula}_{ikst}^{\text{Price}} + \lambda_5 \text{Copula}_{ikst}^{\text{Disc}} + \lambda_6 \text{Copula}_{ikst}^{\text{Vari}} + w_{ikst}$$

In study 1, we have generated the number of delisting, elimination and introduction per month per store. In this study, the variables are coded slightly difference because households did not visit the stores every month. Specifically, *Delist, Elimination and Intro* are the cumulative number of product delisting, elimination and introductions since households' previous trip respectively.

We also control for some demographic characteristics and dummy variables of brand, retailer and seasonality. Similarly to Study 1, copula terms are used to control the potential endogeneity of marketing activities.

γ_{ikst} captures individual random effect. The coefficients α_1 to α_{15} represent the effect of independent variables. Our hypothesis 1 and 2 predicts the coefficient of product elimination (α_8) will be positive and the coefficient of delisting (α_9) will be negative.

Data and Measurements

In addition to the NielsenIQ retail scanner data in Study 1, we use NielsenIQ consumer panel to obtain household purchase information. There are 330 households who visited the stores and purchased from the brand identified in Study 1. The merged dataset includes a total of 7,366 observations across 12 brands, 12 stores, and 45 months.

Our dependent variable is log-transformed brand spending in units. To avoid negative values of the dependent variable we add 1 to the raw value before taking the log transform. There are two variables to control for inventory, the amount of previous purchase and the time since previous purchase. We also control for brand preference, which is the log transform of unit spending of the brand one year before the observation period. Same as Study 1, we include three marketing variables. *Log Price* is the log transform of sales-weighted average price per unit (total dollars sales divided by total unit sales). *Discount* is the log transform of average number of products with a discount. *Variety* is the total number of SKUs.

As households didn't visit the stores every month, we used cumulative number of product introductions, eliminations and delistings since the previous visit of the store. For example, if the household visited the store when t=1, t=3 and t=8, the observation at t=1 was dropped because this was the first visit in the dataset. When t=3, Delist, for example, were coded as the sum of number of delisting in the store in t=2 and t=3. Similarly, when t=8, Delist was coded as the sum of number of delisting in the store from month 4 to 8. Elimination and Intro are coded in the same manner.

Lastly, we include demographic variables to control for observed heterogeneity. There are six levels in *income*: annual income less than $25,000, between $24,000 to $34,000, between $35,000 to $49,000, between $50,000 to $69,000, between $70,000 to $99,000, over $100,000. There are four levels in the *size* of the household: one individual, two individuals, three or four individuals, five and over five individuals. There are three levels in *marital status*: married, single and others. Table 7 lists the details of data operationalization. Table 8 presents the correlations and descriptive statistics of key variables. The variance inflation factor test suggests that there is no concern of multicollinearity (the maximum VIF = 3.55 < 10) (Neter et al., 1990).

Table 3-7: Data Operationalization in Study 2

Variable	Description
Lag spending	Log unit spending in household's previous trip of brand k in store s
Time_since_lasttrip	Time since household's last trip in store s
Brand preference	Log transform of unit spending of the brand in initialization period
Log price	Log transform of sales weighted price in cents per oz
Discount	The average percentage of products that are on discount
Variety	The total number of SKUs the brand has
Intro	Number of introductions since household's previous trip to the store
Elimination	Number of elimiantions since household's previous trip to the store
Delist	Number of delistings since household's previous trip to the store
Household Income	Annual income in 6 levels: <$25k, $24-$34k, $35k-$49k, $50k-$69k, $70k-$99k, $100+
Household Size	4 levels: 1, 2, 3/4, 5 and over
Household Marital Status	Categorical variable that includes married, single and others

Table 3-8: Correlations and descriptive statistics of variables

Variables	1	2	3	4	5	6	7	8	9
1. Lag spending	1.00								
2. Time_since_lasttrip	0.01	1.00							
3. Brand preference	0.29	-0.07	1.00						
4. Log price	-0.20	-0.06	-0.21	1.00					
5. Discount	0.01	0.03	-0.05	-0.09	1.00				
6.Variety	0.25	0.06	0.14	-0.44	0.09	1.00			
7. Intro	0.07	0.68	0.00	-0.20	-0.02	0.21	1.00		
8. Elimination	0.04	0.65	0.00	-0.15	0.03	0.20	0.53	1.00	
9. Delist	0.05	0.74	-0.02	-0.13	0.06	0.26	0.70	0.67	1.00
Summary Statistics									
Mean	1.44	2.38	1.70	-1.78	0.43	49.41	1.68	1.30	2.96
SD	1.77	3.38	2.41	0.25	0.18	25.81	4.09	3.31	6.55
Min	0.00	1.00	0.00	-2.59	0.00	1.00	0.00	0.00	0.00
Max	5.95	40.00	7.39	-0.75	1.00	111.00	67.00	48.00	75.00

Results

Table 9 shows the estimation results. Both inventory control variables are significant (α_1= 0.513, 95%CI [0.419,0.606]; (α_2= 0.073, 95%CI [0.020,0.126]). We also find a positive significant

effect of brand preference (α_3 = 0.129, 95%CI [0.054,0.203]). In addition, the effect of price (α_4 = -2.526, 95%CI [-5.758,0.705]) and discount (α_5 =-1.015, 95%CI [-6.356,4.325]) are insignificant. There is a positive significant effect of variety (α_6 = 0.034, 95%CI [0.011,0.058]).

Table 3-9: The Impact of Product Introduction and Removal on Brand Sales

Variables	Coef	SE	95% CI	
Lag spending	0.513	0.048	0.419	0.606
Time_since_lasttrip	0.073	0.027	0.020	0.126
Brand preference	0.129	0.038	0.054	0.203
Log price	-2.526	1.649	-5.758	0.705
Discount	-1.015	2.725	-6.356	4.325
Variety	0.034	0.012	0.011	0.058
Delist	-0.037	0.016	-0.069	-0.005
Elimination	-0.032	0.022	-0.074	0.011
Intro	-0.013	0.018	-0.048	0.021

*N=7,366

Consistent with Study 1, hypothesis 2 is supported with a negatively significant impact of product delisting (α_7 = -0.037, 95%CI [-0.069,-0.005]). There is no significant positive impact of product elimination (α_8 = -0.032, 95%CI [-0.074,0.011]), which rejects our Hypothesis 1. The results show that product delisting will decrease households' purchases after controlling for consumer heterogeneity and marketing activities, but product elimination has no effect on improving the purchases.

Study 3: Difference-in-Difference Analysis

Our third study aims to validate the results in Study 1 controlling for household, SKU and brand characteristics and providing supports for H3-H6. The analysis utilizes NielsenIQ consumer panel and retail scanner data in the yogurt category in 2018 from over 25,000 households in the US. In order to examine the causal effect of product delist and elimination on consumer purchase, we use a difference-in-differences model. We compare the changes in brands' purchase volume between consumers who experience the delist or elimination versus those who do not experience the removal.

Model

The difference-in-difference model is specified as follows:

$$(4)\ \text{Sales}_{it} = \beta_0 + \beta_1 \text{Treatment}_i + \beta_2 \text{Post\_Removal}_t + \beta_3 \text{Treatment}_i \times \text{Post\_Removal}_t + \beta_4 X_{it} + \alpha_i + \varepsilon_{it}$$

where *i* represents a household, and *t* is the time of store visit; $Sales_{it}$ is the log-transformed sales volume of the brand of the removed SKU (referred to as the "focal brand" for the rest of this dissertation) of household *i* in time *t*; $Treatment_i$ indicates the group household *i* belongs to. $Treatment_i$ equals to 1 if household *i* experience product elimination or removal and 0 otherwise. $Post\_Removal_t$ is the time dummy which equals to 1 if *t* is in post removal period and 0 if it's before the removal event. X_{it} is a vector of control variables including situational factors such as brand price, variety, and store variety; household level characteristics such as households' previous experience with the focal brand, the number of different brands and retailers the household engages with, and demographic characteristics. X_{it} also includes the characteristics of the removed SKU such as average sales, price, and the number of stores it is available at prior to the removal. α_i is a household-specific random error to capture unobserved individual effects and ε_{it} is a random error

term. All together, these variables help to control for the non-randomness in product elimination and delisting. β_0 indicates the average sales of households in the control group prior the removal, β_1 measures the mean differences in sales between the treatment and control groups, β_2 is the mean differences in sales prior to and after the removal in the control group, and β_3 reveals the effect of product elimination and delisting. When β_3 is negative, it indicates a decrease in sales volume of the focal brand.

Data

Similar to study 1, we first use NielsenIQ retail scanner data in the yogurt category to identify product delisting and elimination at each store during 2018. We define a product as delisted for household *i* if the removed SKU is available at other stores for at least 30 days. We define a product as eliminated for household *i* if the removed SKU is eliminated from all stores within 30 days.

Then, we construct the treatment group of delisting and elimination by identifying households who 1) visited more than one retailer and 2) purchased the removed product at least once, one month prior to the removal. Using the week of removal as the time of treatment, we construct the pre-removal period T1 as eight weeks before the removal and post-removal period T2 as eight weeks after the removal. As the average purchase frequency of yogurt is about four weeks, an eight-week interval is enough for the household to notice the removal (Statista, 2021). We also ensured that households had visited the store at least once in both the pre- and post-removal periods, to confirm the meaningful before/after comparison. Our final treatment group of delisting includes 343 unique households and 377 delisting events (435 household-event combinations). Because each household may visit the store multiple times during T1 and T2, there are 11,968 observations in total. Our final treatment group of elimination consists of 166 unique

households, 178 elimination events (189 household-event combinations) and 5,976 observations. Altogether, the treatment sample includes 488 unique households, 516 delisting and elimination events (642 household-event combinations) and 17,944 observations.

The control group consists of households who also purchased the removed products in T1, for whom the products were still available in T2. We first identified all possible observations that qualify the one-month prior shopping criteria with respect to the 516 delisting and elimination events. This pool of control observations includes 26,665 household-event combinations and 395,776 observations. Next, we used propensity scores matching within independent events to draw the final sample. That is, treatment observations of removal event A were only be matched with control observations of the same event A. We estimated the propensity score of a household's experiencing the removal event as a probit function of households' behavioral and demographic characteristics. Then, each household-event combination in the treatment group was paired with one from the control group based on the proximity of their propensity scores (Andrews et al., 2015). The final data includes 9,524 pre-removal observations, 8,586 post-removal observations, 8,893 pre control observations and 8,586 post control observations.

Measures

Table 9 summarises variable names and descriptions. Our dependent variable is the natural logarithm of households' units spendings on the focal brand. There are three sets of covariates as control variables. The first set is situational variables. Because the treatment group and control group shop at different stores, we control for the shopping environment by including brand and store level time-varying variables. *Brand Price* is the sales-weighted average price of the focal brand. *Brand Discount* captures the percentage of SKUs of the focal brand that have a discount. *Brand Variety* captures the depth of the focal brand's portfolio. *Store Variety* is measured by the

number of different brands offered at the store. Secondly, we control for household-level characteristics using behavioral and demographic variables. *SKU History* and *Brand History* are measured by the sum of spending of the removed SKU and focal brand in the last six months prior to the removal. *Variety Seeking Brand* and *Variety Seeking Retailer* are the number of different brands and retailers (respectively) from which the household made purchases during the six months prior to the removal. The demographic variables include household income, size, marital status, race and whether they have children. Lastly, we control for the characteristics of the removed SKU. We randomly sampled 1,000 stores from the scanner data and constructed *SKU Sales* as the log-transformed average weekly sales of the removed SKU, *SKU Price* as the average price per unit and *SKU Store Availability* as the number of stores where the SKU is distributed six months prior the removal. In addition, we control for brand and retailer fixed effects. Table 10 contains the descriptive statistics of our covariates, while Table 11 reports the balance of the control and treatment groups after matching. The two groups are well-balanced, with all of the standardized mean differences are below the threshold of 0.25 (Shi et al, 2017).

Table 3-10: Variable Descriptions in Study 3

Variable Categories	Variables	Description
DV	Sales	Natural logarithm of the households' units spending of the removed SKU's brand
IV - Situation	Brand Price	Natural logarithm of the sales weighted average price of the removed SKU's brand
	Brand Discount	Natural logarithm of the percentage of SKUs on discount
	Brand Variety	Natural logarithm of the number of SKUs offered at the store
	Store Variety	Natural logarithm of the number of brands offered at the store
IV- Household Behavioral Characteristics	Brand History	Natural logarithm of the households' units spending of the removed UPC's brand 6 months before removal
	SKU History	Natural logarithm of the households' units spending of the removed SKU 6 months before removal
	Variety Seeking Brand	Natural logarithm of the number of different brands household purchased 6 months before removal
	Variety Seeking Retailer	Natural logarithm of the number of different retailers the household purchased 6 months before removal
IV - Household Demographics	Household Income	Annual income in 6 levels: <$25k, $24-$34k, $35k-$49k, $50k-$69k, $70k-$99k, $100+
	Household Size	4 levels: 1, 2, 3/4, 5 and over
	Household Children	Equals to 1 if the household has child/children
	Household Marital Status	Categorical variable that includes married, single and others
	Household Race	Categorical variable that includes White/Caucasian, and others
IV - SKU Characteristics	SKU Sales	Natural logarithm of the average sales in units of the removed SKU 6 months before removal
	SKU Store Availability	Natural logarithm of the the number of stores where the removed SKU is available 6 months before removal
	SKU Price	Natural logarithm of the the average price per unit of the removed SKU 6 months before removal
	SKU Across Similarity	Natural logarithm of the average percentage of competing products that shares the same attributes (multipack, flavor, type, style)
	SKU Within Similarity	Natural logarithm of the percentage of same brand products that shares the same shares the same attributes (multipack, flavor, type, style)

Table 3-11: Correlation and Descriptive Statistics in Study 3

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1. Brand Line Length	1.00																		
2. Brand Discount	-0.08	1.00																	
3. Brand Variety	-0.21	0.14	1.00																
4. Store Variety	-0.05	0.13	0.54	1.00															
5. Brand History	-0.04	0.02	0.23	0.12	1.00														
6. Variety Seeking Brand	-0.04	0.01	0.10	0.02	0.54	1.00													
7. Variety Seeking Retailer	0.02	0.04	0.12	0.22	0.12	-0.07	1.00												
8. Household Income	0.07	0.02	-0.12	0.01	-0.05	-0.06	0.08	1.00											
9. Household Size	0.02	0.01	0.06	0.15	0.04	0.04	0.05	0.02	1.00										
10. Household Children	-0.04	0.00	-0.04	0.04	0.07	0.02	0.13	0.04	0.22	1.00									
11. Household Married	-0.03	0.01	-0.06	-0.01	0.03	-0.03	0.12	0.01	0.13	0.63	1.00								
12. Household Single	-0.05	-0.03	0.00	0.00	0.01	0.03	0.04	0.10	0.25	0.35	0.19	1.00							
13. Household Race White	0.02	0.00	0.00	-0.10	0.02	0.00	-0.03	-0.06	-0.21	-0.30	-0.18	-0.58	1.00						
14. SKU Sales	-0.03	-0.07	0.06	0.06	0.08	0.03	0.05	-0.07	0.01	-0.05	-0.09	0.02	-0.04	1.00					
15. SKU Availability	0.04	-0.02	-0.09	-0.07	0.04	0.09	-0.15	-0.04	0.05	0.04	0.09	-0.03	0.00	-0.06	1.00				
16. SKU Price	0.14	-0.04	-0.38	-0.27	-0.10	-0.03	-0.02	0.11	0.04	0.05	0.07	0.00	-0.03	0.00	0.17	1.00			
17. SKU Across Similarity	0.03	0.01	-0.09	-0.05	-0.01	-0.12	0.07	0.11	0.07	-0.01	-0.02	-0.02	0.02	0.01	-0.31	0.07	1.00		
18. SKU Within Similarity	0.09	0.07	0.17	0.04	0.14	0.20	0.04	0.05	0.00	-0.04	-0.08	0.05	-0.04	0.05	-0.28	-0.11	0.18	1.00	
19. SKU Age	0.08	0.00	-0.08	-0.05	0.20	0.12	0.02	0.07	0.05	-0.04	-0.07	-0.02	0.01	0.09	-0.12	0.01	0.49	0.42	1.00
Summary Statistics																			
Mean	-1.80	-1.78	4.05	2.62	4.19	2.49	1.12	0.98	23.02	2.88	0.25	0.73	0.11	0.87	3.95	2.58	-1.74	-1.17	-0.88
SD	0.19	1.39	0.52	0.42	1.24	0.96	0.61	0.44	4.70	1.40	0.44	0.44	0.31	0.33	0.53	0.67	0.27	0.30	0.30
Min	-4.43	-4.61	0.01	0.01	0.70	0.70	0.01	0.01	3.00	1.00	0.00	0.00	0.00	0.00	2.94	0.01	-2.33	-4.61	-1.92
Max	-1.00	0.01	5.02	3.43	7.39	6.45	2.49	2.20	27.00	9.00	1.00	1.00	1.00	1.00	6.07	4.43	-1.12	-0.27	-0.27

Table 3-12: Mean Differences Between Control and Treatment Groups in T1 after Matching

	Control Group		Treatment Group			Standardized Mean
	M	SD	M	SD	Mean Difference[a]	Difference[b]
Brand Price	0.16	-0.03	0.16	-0.03	0.00***	0.124
Brand Discount	0.29	-0.24	0.29	-0.26	0.00***	0.032
Store Variety	14.79	-5	14.51	-5.09	0.28**	0.057
SKU History	2.48	0.94	2.52	1.00	-0.04***	0.042
Brand History	4.23	-1.24	4.23	-1.17	0.00	0.006
Variety Seeking Brand	3.65	-2.05	3.56	-1.92	0.09***	0.046
Variety Seeking Retailer	2.82	-1.32	2.97	-1.01	-0.15***	0.131
Household Income	23.23	-4.59	22.88	-4.76	0.35***	0.074
Household Size	2.87	-1.37	2.91	-1.46	-0.04**	0.031
Household Children	0.25	-0.43	0.26	-0.44	-0.01***	0.039
Household Married	0.74	-0.44	0.73	-0.45	0.01	0.026
Household Single	0.10	-0.31	0.12	-0.32	-0.02***	0.043
Household Race	0.87	-0.33	0.88	-0.33	-0.01	0.004

*p<0.10
**p < .05
***p<.01
[a]Statistical significance of group mean difference t-test.
[b]Difference in means between the treatment and control groups divided by the standard deviation of the treatment group. A value below 0.25 indicates good balance (Shi et al., 2017).

Results

We report our estimations in Table 12. Model 1 and Model 2 are the results of our difference in difference model for elimination and delisting groups respectively. Consistent with our aggregate model in study 1, the treatment effect is insignificant in the elimination group (β_3=-.05, p=.59) and negatively significant in the delisting group (β_3=-.26, p=0.01), which translates to an approximate 23% sales decrease.

To further explore the differential impact of elimination and delisting, we run an additional analysis to examine the change of sales of other brands in the store. Using the same matched sample in Model 1 and 2, we use the log transform of unit sales of all other brands in the yogurt category as the dependent variable. We replace the situational characteristics with the average price and discount percentage of all other brands in the store. We replace *Brand History* with the

natural logarithm of the households' units spending of all other brands six months before removal. Model 3 and Model 4 presents the results with the new dependent variable (Table 12).

Again, we find an insignificant treatment effect in the elimination group (coefficient = -0.06, p=0.57). The insignificant effects in Model 1 and 3 suggest a within-brand substitution pattern. Consumers are more likely to stay with the brand experiencing product elimination by purchasing other items of the brand. In Model 4, however, we find a positively significant treatment effect (coefficient = 0.17, p=0.04). This result indicates that product delisting leads to a 19% sales increase in competing brands. The results of Models 2 and 4 further support our hypothesis 2 that in the case of delisting, retailers do not compensate delisted brands, and rival brands benefit from the event.

Table 3-13: Difference in Differences Model Results

	(Model 1) Elimination Focal Brand		(Model 2) Delisting Focal Brand		(Model 3) Elimination Competing Brand		(Model 4) Delisting Competing Brand	
	Coef	SE	Coef	SE	Coef	SE	Coef	SE
(Intercept)	-8.13***	1.56	-8.58	.77	-9.62***	1.41	-8.00***	1.05
Treatment Dummy	.04	.14	.02	.13	.14	.13	-.24***	.09
Post_Removal Dummy	-.67***	.09	-.61***	.11	.16**	.07	.04	.05
DD	-.05	.10	-.26**	.10	-.06	.10	.17**	.08
Brand Price	-.86**	.39	-1.29***	.25	-1.03**	.52	-.90***	.33
Brand Discount	.11***	.02	.22**	.10	-.03	.05	.01	.03
Brand Variety	.37**	.18	.00	.13	.33	.23	.14	.16
Store Variety	.33	.29	.65	.04	.64	.07	.35	.04
Brand History	.54	.04	-.21***	.08	.65***	.14	1.04	.08
Variety Seeking Brand	-.26***	.08	.15*	.08	.41***	.13	.02	.10
Variety Seeking Retailer	.36**	.14	.02	.01	.00	.02	-.01	.01
Household Income	.02	.02	-.01	.05	-.14**	.06	.00	.04
Household Size	-.06	.06	.15	.16	.64***	.19	.28***	.10
Household Children	.30	.21	-.26*	.13	-.03	.24	-.19*	.10
Household Married	-.17	.19	.01	.17	.21	.29	.01	.15
Household Single	.09	.19	.05	.13	.46**	.21	.04	.15
Household Race White	.08	.17	.00	.08	-.18	.12	.07	.07
SKU Sales	-.16*	.09	.00	.00	.01	.01	.01***	.00
SKU Availability	.01	.01	1.57**	.63	.20	1.33	.12	.79

SKU Price	.49	1.53	-.35***	.12	-.09	.15	.09	.10
Brand Fixed Effect	Yes		Yes		Yes		Yes	
Retailer Fixed Effect	Yes		Yes		Yes		Yes	
Random Effect	Yes		Yes		Yes		Yes	
R2	0.05		0.05		0.05		0.05	
Observation	11686		23642		11686		23642	
Sigma_u	2.69		2.98		2.89		2.74	
Sigma_e	0.88		1.05		1.18		1.18	
Rho	0.33		0.35		0.41		0.43	

*p<0.10

**p < .05

***p<.01

To test H3-H6, we estimate Equation 4 for the delisting sample:

$$(4)\text{Sales}_{it} = \beta_0 + \beta_1\text{Treatment}_i + \beta_2\text{Post}_{\text{Delist}_t} + \beta_3\text{Treatment}_i \times \text{Post}_{\text{Delist}_t} +$$

$$\beta_4\text{Treatment}_i \times \text{Post}_{\text{Delist}_t} \times \text{SKU\_Across\_Similarity} +$$

$$\beta_5\text{Treatment}_i \times \text{Post}_{\text{Delist}_t} \times \text{SKU\_Within\_Similarity} +$$

$$\beta_6\text{Treatment}_i \times \text{Post}_{\text{Delist}_t} \times \text{SKU\_History} +$$

$$\beta_7 X_{it} + \alpha_i + \varepsilon_{it}$$

We include only three interaction terms in this model as the control group did not experience the delisting. The characteristics of the delisted SKU only matters to the treatment group after the delisting. This specification is similar to those adopted by Shi et. al. (2017). We use four attributes to measure product similarity: Multipack, Flavor, Type (lactose free, low fat, no fat, regular), and Style (Greek, organic, regular). Then for example, if a product shares one attribute with the delisted SKU, its similarity with the product is coded as 0.25. If it shares 2, 3 or all attributes, its similarity is 0.5, 0.75 or 1. Next, we compute within (across) brand similarity by averaging all products of the focal (competing) brand's similarity score. SKU_History is defined

the same as before: the natural logarithm of the households' units spending of the removed SKU six months before removal.

Table 13 provides the results from our interaction models (Model 5 and 6). The results reveal a negative moderation effect of across brand similarity (coefficient = -0.36, p=0.05) and a positive effect of within brand similarity (coefficient = 0.45, p=0.001) in the delisting sample. The effects are not significant in the elimination sample. Product differentiation has a strong effect in defending brands' market share when facing delisting. This result supports H4 and rejects H3.

In addition, the household's previous purchase of the removed SKU significantly impact the treatment effect ($coef_{elimination}$ = -0.15, p=0.02; $coef_{delisting}$ = -0.17, p<0.001). Table 14 lists the treatment effect for elimination and delisting when household's previous purchase ranges from the low tail (-2SD) to high tail (+2SD). The results suggest that elimination has a positive impact of brand sales if customers have little experience with the removed SKU (when SKU_History =-2SD, $coef_{elimination}$ = 0.21, p=0.09). For those extremely attached to the remove SKU (when SKU_History =+2SD), elimination establishes a negative effect ($coef_{elimination}$ = -0.33, p=0.06). This provides partial support to H1 and suggests that the positive effect of elimination is balanced out by the negative reactions of customers who enjoyed the eliminated product a lot. Delisting on the other hand, does not lead to positive impact on the brand even for low-engaged customers (when SKU_History =-2SD, $coef_{delisting}$ = 0.08, n.s.).

Table 3-14: Interaction Models

	(Model 5) Elimination		(Model 6) Delisting	
	Coef	SE	Coef	SE
(Intercept)	-8.08***	1.56	-7.43	.81
Treatment Dummy	.03	.14	.02	.13
Post_Removal Dummy	-.67***	.09	-.63***	.11
DD	-.06	.10	-.25**	.10
DD*Across Similarity	-.20	.22	-.36**	.18

DD*Within Similarity	.01	.21	.45***	.15
DD*SKU History	-.15**	.06	-.17***	.05
Control Variables	Yes		Yes	
Brand Fixed Effect	Yes		Yes	
Retailer Fixed Effect	Yes		Yes	
Random Effect	Yes		Yes	
R2	0.05		0.05	
Observation	11686		23642	
Sigma_u	2.68		2.97	
Sigma_e	0.88		1.06	
Rho	0.33		0.36	

*p<0.10
**p < .05
***p<.01

Table 3-15: Marginal Effects of DD

	Coefficient of DD	
SKU History	**Elimination**	**Delisting**
- 2SD	.21*	.08
- SD	.08	-.08
Mean	-.06	-.25**
+ SD	-.20	-.41***
+ 2SD	-.33*	-.58***

*p<0.10
**p < .05
***p<.01

General Discussion

This article proposed the adoption of a dual manufacturer-retailer perspective on product removal and described two empirical investigations into the impact product removal can have on brand performance. We began our argument by distinguishing between two types of product removal with distinct causes and consequences. One is product delisting, typically initiated by retailers and theoretically more harmful to brands, while the other is product elimination, which is usually brand-initiated for the purposes of reducing excess product variety or freeing up production resources. We studied the consequences of these two types of removals on manufacturer brands in the context of the yogurt market, acting under the hypothesis that delisting is more likely to hurt the brand than elimination.

Our results from both aggregate models (Study 1) and household-level models (Study 2 & Study 3) provided strong support for that prediction. In Study 1 and Study 2, we quantified the effect of product removal on the entire market. We found that delisting had a significant impact on brands' aggregate baseline sales and households' basket spending, whereas elimination has no significant impact. In Study 3, we restricted our examination to customers who had previously purchased the removed products, and found that delisting leads to a 23% sales decrease for the focal brand and a 19% sales increase for competing brands, whereas elimination does not significantly influence focal brand sales or those of competitors.

We also explored the boundary conditions of the effect of product removal. For both elimination and delisting, the negative impact was stronger for heavy/habitual buyers of the removed product. The positive impact of elimination exists for those had little experience with the eliminated product. Moreover, to overcome the risks of delisting, brands should increase the similarity within their portfolio and differentiate from competing brands. We believe these findings

are of immediate relevance to brand managers, purchasers, and other stakeholders in the retail-manufacturer channel, and constitute a substantive contribution to the marketing mitigation literature. They point toward the need for additional study of the practices and power dynamics that shape product removal decisions and their impact on brands.

Implications for Theory

This study provides several insights into purchasing behavior that are relevant for the product management literature. First, while much research in marketing focuses on product innovations (e.g. Atuahene-Gima, 2005), line extension (Hamilton and Chernev, 2007), discussions on how products exit the market has been scarce (Zhu et al., 2021). Through a bibliometric review, Zhu et al. (2021) discover a research gap in studying the outcomes of product removal. This research fills in the gap by quantifying the consequences of product elimination and delisting at market and household level.

An equally substantive contribution from this paper is our recommended dual-perspective approach to studying delisting and elimination. This approach is more important than ever, given the current power of retailers and the severe competition over market share for fast-moving consumer goods. While distribution is widely recognized as an essential factor for the success of product or brand introduction (e.g., Ataman et al., 2008), existing literature has largely overlooked the role of distributors on the removal process and accordingly has underestimated the potential damage that delisting can have on manufacturer brands. In our studies, we found that about half of all product removals are driven by retailers. Given that these delistings are significantly more negative for brands than planned eliminations, it is important not only to separate the two processes analytically but to view them as originating from fundamentally different sets of decision-making considerations. Prior research shows that the perceived quality of a firm's implementation and

outcomes for product removal substantially reduce the psychological and economic costs associated with the product's absence (Homburg et al., 2010); product delistings not only ignore these potential downsides for manufacturer brands, they may leverage them to turn attention toward store brands or increase competing stores' inventory costs.

A final theoretical contribution concerned our testing of boundary conditions for the effects of product removal. First, we confirm that product differentiation can help brands to retain customers in the case of delisting. Having a most similar alternative within the brand prevent customers from switching to another brand when retailers decide to delist the product.

Second, consumers' relationship with the removed SKU is also important in predicting the effect of elimination and delisting. For heavy users, both elimination and delisting lead to dissatisfaction and sales decrease, whereas for rare users, the impact of elimination turns to be positive. This heterogeneity highlights the importance of personalized communication and customer relationship management. Research on product unavailability should consider these kinds of consumer differences and explore the potential to mitigate reactions using new products, messaging or marketing in advance of removal, or other strategies.

Implications for Practice

Our results also point toward several implications for practice. First, manufacturers would benefit from paying greater attention to the impact of retailers' delisting decisions, and especially from building safeguards into listing contracts to secure their competitive positioning. Our results suggest that product delisting leads to a 19% sales increase for competing brands. Given the scale of these consequences, maintaining healthy relationships with retailers looks even more important as a mechanism for manufacturers to protect market share and preserve consumer loyalty.

The same considerations have implications for policymakers and regulators. A standardized delisting procedure could prevent manufacturer firms from being exploited by powerful retailers. The Groceries Supply Code of Practice in the UK provides one example of what such a standardization can look like, requiring retailers to provide explicit reasoning and adequate time for suppliers to respond to the delisting (Gov.UK, 2009). However, recent research has found that retailers often do not comply with the code and rarely discuss delisting decisions with suppliers in advance of their implementation (Field Seymour Parkes, 2020). Better policy design and enforcement are clearly needed to improve retailers' conduct. These changes would have secondary benefits, as well: when suppliers are better prepared for delisting, consumers will also benefit from more advance warning, better preparation, and potentially from available alternative products.

In addition, our findings offer useful guidelines for mitigation strategies for the negative effects of product removal. Previous research suggests that price promotion can recapture lost sales resulting from temporary product unavailability (Musalem et al., 2010). We extended those findings by investigating the effectiveness of brand differentiation and consumer heterogeneity on product removal at the brand level. When products are forced to exit certain retailers, unique attribute design and portfolio management help to alleviate the shock to consumers and defend brands' market share. Greater similarity to brands' own SKUs and dissimilarity to competitors' SKUs induce consumers to select a substitute from the same brand. On one hand, marketers can strengthen the perception of its own products' similarity not only through attributes design but also through packaging, presentation and advertising messages. On the other hand, by offering unique value or attributes, brands are able to retain consumers when facing external pressure such as product delisting.

In term of consumer heterogeneity, it is important to consider the relationship between customers and to-be-removed products. Targeted compensation strategy may be more effective in both mitigating the negative impact of removal and maintaining positive relationships with consumers who are not affected by it. For example, retailers can utilize omnichannel marketing strategies to distribute coupons personalized by customer characteristics and purchase history (Li et al., 2021). Existing studies on product unavailability in other contexts have also explored mitigation through communication (e.g., announcing before vs. during the removal event), offering replacement items, or offering financial compensation (Breugelmans et al., 2018). In the case of elimination, brands can utilize customer relationship management systems and provide targeted notices, suggestions, or compensation for loyal consumers of the removed products. Those messages could help reduce the psychological and economic costs associated with the removal. In the case of delisting, brands should inform the consumers that the products are still available through other channels to help minimize customer churn.

Limitations and Further Research

The three studies reported here have several limitations that point toward fruitful avenues for future research. First, we focus on just one category of consumer goods. Because of this limitation, we were unable to explore how category characteristics influence the impact of product removal. Future research should investigate product removal effects in a multi-categorical context and account for potential substitutions between categories. For example, the switching costs related to the removal of experience goods should be higher than those associated with search goods, the quality and features of which are less uncertain for consumers. Future work might also explore how the removal of unhealthy products influences the purchase of healthier alternatives and potentially contributes to healthy consumption habits.

In addition, although we included basic brand and retailer characteristics as control variables, we were unable to assess the impact of brand strength or brand-retailer relationships on the effects of removal. Such an assessment would be possible in a study that considered multiple product categories with a larger number of brands and more variable brand characteristics. For example, a first-mover advantage may help mitigate the impact of removal. Some retailers also depend on category captains—leading manufacturers within that category—to optimize assortment management (Ailawadi et al., 2010). It is possible that the impact of removal for these category captain brands is less than it is for their less established rivals.

A third area where our work might be expanded upon concerns the details of consumer behavior. Although we were able to detect the differences between delisting and elimination for the consequences of the removal, we did not empirically test the mechanisms involved. Well-designed behavioral economics experiments might help ascertain whether our results here were driven by differences in the processes product removal, or whether they are tied to other mechanisms entirely. That work could then lead to the exploration of other mitigation strategies.

Lastly, while we were able to identify and track delisting events, we did not distinguish the cause of delisting in each case. Subsequent studies could provide a more in-depth understanding of retailer decision-making and how distinct motivations for delisting lead to differing market reactions. For example, if a retailer delists a product for the sake of category improvement, all brands in the category should be affected. Whereas when retailers aim to strengthen store brands by strategically delisting key competitors, the impact on other brands may be reduced.

References

Aaker, David A., and Robert Jacobson (2001), "The Value Relevance of Brand Attitude in High-Technology Markets," *Journal of Marketing Research,* 38(4).

Adams, Christina, Alldredge, Kari, Mueller, Curt, & Whitmore, Justin (2016), "Simpler is (sometimes) better: Managing complexity in Consumer Goods", (accessed March 3, 2023), https://www.mckinsey.com/industries/consumer-packaged-goods/our-insights/simpler-is-sometimes-better-managing-complexity-in-consumer-goods.

Ailawadi, Kusum L., Praveen K. Kopalle, and Scott A. Neslin (2005), "Predicting competitive response to a major policy change: Combining game-theoretic and empirical analyses," *Marketing Science,* 24(1), 12-24.

Ailawadi, Kusum L., Zhang Jie, Krishna Aradhna, and Kruger, W. Kruger (2010), "When Wal-Mart enters: How incumbent retailers react and how this affects their sales outcomes," *Journal of Marketing Research,* 47(4), 577-593.

Andrews, Michelle, Xueming Luo, Zheng Fang, and Anindya Ghose (2015), "Mobile Ad Effectiveness: Hyper-Contextual Targeting with Crowdedness," *Marketing Science,* 35 (2), 218–33.

Anupindi, Ravi, Sachin Gupta, and Munirpallam A. Venkataramanan (2009), "Managing Variety on the Retail Shelf: Using House- hold Scanner Panel Data to Rationalize Assortments," in *Retail Supply Chain Management: Quantitative Models and Empirical Studies*, S. Smith and N. Agarwal, eds. New York: Springer, 155–82.

Arens, Zachary G., and Rebecca W. Hamilton (2018), "The substitution strategy dilemma: substitute selection versus substitute effectiveness," *Journal of the Academy of Marketing Science*, *46*, 130-146.

Argouslidis, Paraskevas C (2008), "Determinants of the speed of elimination decision making in financial services, " *Journal of Services Marketing*, 22(3), 237-254.

Argouslidis, Paraskevas C., and Fiona McLean (2001), "Service elimination decision making: preliminary empirical evidence from the UK financial services sector," *International Journal of Bank Marketing*, 19(4), 166-178.

Argouslidis, Paraskevas C., and George Baltas (2007), "Structure in product line management: The role of formalization in service elimination decisions," *Journal of the Academy of Marketing Science*, 35(4), 475-491.

Ataman, M. Berk, Carl F. Mela, and Harald J. Van Heerde (2008), "Building brands," *Marketing Science*, 27(6), 1036-1054.

Ataman, M. Berk, Harald J. Van Heerde, and Carl F. Mela (2010), "The long-term effect of marketing strategy on brand sales," *Journal of Marketing Research*, 47(5), 866-882.

Atuahene-Gima, Kwaku (2005), "Resolving the capability–rigidity paradox in new product innovation," *Journal of marketing*, *69*(4), 61-83.

Avlonitis, George J., and Paraskevas C. Argouslidis (2012), "Tracking the evolution of theory on product elimination: Past, present, and future," *The Marketing Review*, 12(4), 345-379.

Avlonitis, George J., Susan J. Hart, and Nikolaos X. Tzokas (2000), "An analysis of product deletion scenarios," *Journal of Product Innovation Management*, 17(1), 41-56.

Berger, Jonah, Michaela Draganska, and Itamar Simonson (2007), "The influence of product variety on brand perception and choice," *Marketing Science*, *26*(4), 460-472.

Bloom, Paul N., and Vanessa G. Perry (2001), "Retailer power and supplier welfare: The case of Wal-Mart," *Journal of Retailing*, 77(3), 379-396.

Boatwright, Peter, and Joseph C. Nunes (2001), "Reducing assortment: An attribute-based approach," *Journal of marketing*, 65(3), 50-63.

Boatwright, Peter, and Joseph C. Nunes (2001), "Reducing assortment: An attribute-based approach," *Journal of marketing*, 65(3), 50-63.

Borle, Sharad, Peter Boatwright, Joseph B. Kadane, Joseph C. Nunes, and Shmueli Galit (2005), "The effect of product assortment changes on customer retention," *Marketing science*, 24(4), 616-622.

Breugelmans, Els, Els Gijsbrechts, and Katia Campo (2018), "Product unavailability," In *Handbook of Research on Retailing*, Chap 9. Edward Elgar Publishing, 203-219.

Brexendorf, Tim O., Barry Bayus, and Kevin L. Keller (2015), "Understanding the interplay between brand and innovation management: findings and future research directions," *Journal of the Academy of Marketing Science*, 43(5), 548-557.

Broniarczyk, Susan M., Wayne D. Hoyer, and Leigh McAlister (1998), "Consumers' perceptions of the assortment offered in a grocery category: The impact of item reduction," *Journal of marketing research*, 35(2), 166-176.

Browne, William G., and Patrick S. Kemp (1976), "A three stage product review process," *Industrial Marketing Management*, 5(6), 333-342.

Campo, Katia, Els Gijsbrechts, and Patricia Nisol (2000), "Towards understanding consumer response to stock-outs," *Journal of Retailing*, 76(2), 219-242.

Campo, Katia, Els Gijsbrechts, and Patricia Nisol (2000), "Towards understanding consumer response to stock-outs," *Journal of Retailing*, *76*(2), 219-242.

Campo, Katia, Els Gijsbrechts, and Patricia Nisol (2004), "Dynamics in consumer response to product unavailability: do stock-out reactions signal response to permanent assortment reductions?" *Journal of Business Research*, 57(8), 834-843.

Che, Hai, Xinlei Chen, and Yuxin Chen (2012), "Investigating effects of out-of-stock on consumer stockkeeping unit choice", *Journal of Marketing Research*, 49(4), 502-513.

Closs, David J., Gilbert N. Nyaga, and M. Douglas Voss (2010), "The differential impact of product complexity, inventory level, and configuration capacity on unit and order fill rate performance," *Journal of Operations Management*, *28*(1), 47-57.

Cosgrove, Emma (2020), "Coca-Cola, Mondelez trim skus as cpgs tackle pandemic stresses," (accessed March 3, 2023), https://www.supplychaindive.com/news/coronavirus-supply-chains-SKUs-pandemic-Mondelez-Procter-Gamble-Coca-Cola/579017/

Davies, Gary (1994), "The delisting of products by retail buyers," *Journal of Marketing Management*, *10*(6), 473-493.

Dreze, Xavier, Stephen J. Hoch, and Mary E. Purk (1994), "Shelf management and space elasticity," *Journal of retailing*, 70(4), 301-326.

Dukes, Anthony J., Tansev Geylani, and Kannan Srinivasan (2009), "Strategic assortment reduction by a dominant retailer," *Marketing Science*, *28*(2), 309-319.

Field Seymour Parkes (2020), "Are Retailers following the Rules – Delisting & GSCOP?" (accessed June 16, 2021), https://www.fsp-law.com/are-retailers-following-the-rules-delisting-gscop/

Fitzsimons, Gavan J (2000), "Consumer response to stockouts," *Journal of consumer research*, 27(2), 249-266.

Gilliland, Michael (2011), "SKU Rationalization: Pruning your way to better performance," *The Journal of Business Forecasting*, *30*(3), 28.

Gounaris, Spiros P., George J. Avlonitis, and Paulina G. Papastathopoulou (2006), "Uncovering the keys to successful service elimination: project ServDrop," *Journal of Services Marketing*, 20(1), 24-36.

Gov.UK. (2009), "Guidance Groceries Supply Code of Practice," (accessed June 18, 2021) https://www.gov.uk/government/publications/groceries-supply-code-of-practice

Guszkowski, J. (2017), "Snyder's-Lance to Drop Hundreds of SKUs." (accessed March 3, 2023), https://www.cspdailynews.com/snacks-candy/snyders-lance-drop-hundreds-skus

Hamilton, Ryan, and Alexander Chernev (2010), "The Impact of Product Line Extensions and Consumer Goalson the Formation of Price Image," *Journal of Marketing Research*, *47*(1), 51-62.

Harness, David R., and Norman E. Marr (2004), "A comparison of product elimination success

factors in the UK banking, building society and insurance sectors," *International Journal of Bank Marketing*, 22(2), 126-143.

Harness, David R., and Tina Harness (2012), "Can product elimination support post-downsizing success aspirations?" *Journal of General Management*, 38(2), 39-60.

Homburg, Christian, Andreas Fürst, and Jana-Kristin Prigge (2010), "A customer perspective on product eliminations: how the removal of products affects customers and business relationships," *Journal of the Academy of Marketing Science*, 38(5), 531-549.

Jing, Xiaoqing, and Michael Lewis (2011), "Stockouts in online retailing," *Journal of Marketing Research*, 48(2), 342-354.

Kadiyali, Vrinda, Pradeep Chintagunta, and Naufel Vilcassim (2000), "Manufacturer-retailer channel interactions and implications for channel power: An empirical investigation of pricing in a local market," *Marketing Science*, 19(2), 127-148.

Kalyanam, Kirthi, Sharad Borle, and Peter Boatwright (2007), "Deconstructing each item's category contribution," *Marketing Science*, 26(3), 327-341.

Kratchman, Stanley H., Richard T. Hise, and Thomas A. Ulrich (1975), "Management's decision to discontinue a product," *Journal of Accountancy (pre-1986)*, 139(6), 50.

Li, Zonghuo, Wensheng Yang, Hyun Seung Jin, and Di Wang (2021), "Omnichannel retailing operations with coupon promotions," *Journal of Retailing and Consumer Services*, 58, 102324.

Luckerson, Victor (2014), "Amazon Is Cracking Down on Book Publisher, Say Critics," (accessed June 18, 2021) https://time.com/110412/amazon-hachette-negotiations/

Ma, Zhenfeng, Tripat Gill, and Ying Jiang (2015), "Core versus peripheral innovations: The effect of innovation locus on consumer adoption of new products," *Journal of Marketing Research*, 52(3), 309-324.

McDonald, Kara (2017), "Yogurt Innovation Continues to Drive Growth," (accessed June 18, 2021), http://dairyspotlight.thinkusadairy.org/yogurt-innovation-continues-to-drive-growth

McSurely, Hugh B., and David L. Wilemon (1973), "A product evaluation, improvement and removal model," *Industrial Marketing Management*, 2(4), 319-332.

Mizik, Natalie, and Robert Jacobson (2008), "The financial value impact of perceptual brand attributes," *Journal of Marketing Research*, *45*(1), 15-32.

Muir, Jonathan, and Nina Reynolds (2011), "Product deletion: a critical overview and empirical insight into this process," *Journal of General Management*, 37(1), 5-30.

Musalem, Andrés, Marcelo Olivares, Eric T. Bradlow, Christian Terwiesch, and Daniel Corsten (2010), "Structural estimation of the effect of out-of-stocks," *Management Science*, 56(7), 1180-1197.

Ng, Serena (2014), "P&G to Shed more than Half its Brands: Company to Focus on 70 to 80 Products, Including Tide and Pampers," (accessed June 18, 2021) https://www.wsj.com/articles/procter-gamble-posts-higher-profit-on-cost-cutting-1406892304#:~:text=P%26G%20will%20focus%20on%2070,News%20Hub%20with%20Paul%20Vigna.

Nielsen IQ (2021), "The CPG dilemma: Shelf-space optimization difficult amid crowded product portfolio," (accessed March 3, 2023), https://nielseniq.com/global/en/insights/analysis/2021/the-cpg-dilemma-shelf-space-optimization-difficult-with-crowded-product-portfolios/

NielsenIQ. (2019), "Bursting with new products, there's never been a better time for breakthrough innovation," (accessed June 18, 2021) https://nielseniq.com/global/en/insights/analysis/2019/bursting-with-new-products-theres-never-been-a-better-time-for-breakthrough-innovation/

Oppewal, Harmen, and Kitty Koelemeijer (2005), "More choice is better: Effects of assortment size and composition on assortment evaluation," *International Journal of Research in Marketing*, 22(1), 45-60.

Park, S., & Gupta, S. (2012). Handling endogenous regressors by joint estimation using copulas. *Marketing Science*, *31*(4), 567-586.

PwC (2019), "Unlocking hidden value in product portfolios," (accessed March 3, 2023), https://www.strategyand.pwc.com/us/en/reports/2019/unlocking-hidden-value-product-portfolios.html

Ratneshwar, Srinivasan, and Allan D. Shocker (1991), "Substitution in use and the role of usage context in product category structures," *Journal of Marketing Research, 28*(3), 281-295.

Ritson, Mark (2010), "Manufacturers Losing Power to Retailers," (accessed June 18, 2021) https://www.brandingstrategyinsider.com/manufacturers-losing-power-to-retailers/

Shi, Huanhuan, Shrihari Sridhar, Rajdeep Grewal, and Gary Lilien (2017), "Sales representative departures and customer reassignment strategies in business-to-business markets," *Journal of Marketing*, 81(2), 25-44.

Sloot, Laurens M., and Peter C. Verhoef (2008), "The impact of brand delisting on store switching and brand switching intentions," *Journal of Retailing*, 84(3), 281-296.

Sloot, Laurens M., Dennis Fok, and Peter C. Verhoef (2006), "The short-and long-term impact of an assortment reduction on category sales," *Journal of Marketing Research*, 43(4), 536-548.

Sloot, Laurens M., Peter C. Verhoef, and Philip Hans Franses (2005), "The impact of brand equity and the hedonic level of products on consumer stock-out reactions," *Journal of Retailing*, 81(1), 15-34.

Srinivasan, Shuba, Koen Pauwels, Jorge Silva-Risso, and Dominique M. Hanssens (2009), "Product innovations, advertising, and stock returns," *Journal of Marketing*, 73(1), 24-43.

Sriram, Srinivasaraghavan, Subramanian Balachander, and Manohar U. Kalwani (2007), "Monitoring the dynamics of brand equity using store-level data," *Journal of Marketing*, 71(2), 61-78.

Statista (2020), "Per capita consumption of yogurt in the United States from 2000 to 2019 (in pounds per person)," (accessed June 18, 2021) https://www.statista.com/statistics/184309/per-capita-consumption-of-yogurt-in-the-us-since-2000/#:~:text=The%20timeline%20shows%20the%20per,pounds%20per%20person%20in%202019

Statista (2021), "Purchase frequency of dairy department products in the United States as of December 2020, by category," (accessed June 18, 2021) https://www.statista.com/statistics/1025285/purchase-frequency-of-dairy-in-the-us-by-category/

Steenkamp, Jan-Benedict EM, and Marnik G. Dekimpe (1997), "The increasing power of store brands: building loyalty and market share," *Long range planning*, 30(6), 917-930.

Steiner, Robert L (2004), "The nature and benefits of national brand/private label competition," *Review of Industrial Organization*, 24(2), 105-127.

Van der Maelen, Sara, Els Breugelmans, and Kathleen Cleeren (2017), "The clash of the titans: on retailer and manufacturer vulnerability in conflict delistings," *Journal of Marketing*, 81(1), 118-135.

Varadarajan, Rajan, Mark P. DeFanti, and Paul S. Busch (2006), "Brand portfolio, corporate image, and reputation: Managing brand deletions," *Journal of the Academy of Marketing Science*, 34(2), 195-205.

Wan, Xiang, Philip T. Evers, and Martin E. Dresner (2012), "Too much of a good thing: The impact of product variety on operations and sales performance," *Journal of Operations Management*, *30*(4), 316-324.

Wiebach, Nicole, and Lutz Hildebrandt (2012), "Explaining customers' switching patterns to brand delisting," *Journal of Retailing and Consumer Services*, 19(1), 1-10.

Zhu, Qingyun, Roberto Antonio Martins, Purvi Shah, and Joseph Sarkis (2021), “A bibliometric review of brand and product deletion research: Setting a research agenda,” *IEEE Transactions on Engineering Management*, *70*(2), 554-575.

Disclaimer:

"Researcher(s) own analyses calculated (or derived) based in part on (i) retail measurement/consumer data from Nielsen Consumer LLC ("NielsenIQ"); (ii) media data from The Nielsen Company (US), LLC ("Nielsen"); and (iii) marketing databases provided through the respective NielsenIQ and the Nielsen Datasets at the Kilts Center for Marketing Data Center at The University of Chicago Booth School of Business."

"The conclusions drawn from the Nielsen data are those of the researcher(s) and do not reflect the views of NielsenIQ or Nielsen. Neither NielsenIQ nor Nielsen is responsible for, had any role in, or was involved in analyzing and preparing the results reported herein."

Bridging between the manuscripts

In Essay 1 (Chapter 3), we investigate the influence of product removal, a commonly employed practice in the growingly competitive retail landscape, on manufacturers' sales. We compare the product removal strategies implemented by manufacturers and retailers, finding that while a manufacturer's initiative to eliminate a product has no impact on its sales, a retailer's action of delisting a product has a negative effect on manufacturers' sales at both the aggregate and individual levels. Additionally, we offer actionable insights for managers to mitigate the adverse consequences of product delisting.

While Essay 1 explores one of the direct effects of retailers' product strategies on manufacturer brands, Essay 2 contributes to the literature by revealing an indirect impact of retailers' product decisions through the example of a nutritional claim (a brief message about the product's nutritional information printed on its packaging). Our findings suggest that the effectiveness of nutrition claims diminishes as retailers list more products with such claims. In essence, retailers can indirectly influence the efficacy of manufacturers' strategies by altering competitive dynamics. This essay adds to the product management literature by emphasizing the importance of retailers' indirect role in shaping the success of product design.

Both essays collectively scrutinize the ramifications of retailers' product decisions on manufacturers' performance and the effectiveness of manufacturers' strategies. Unlike many studies on manufacturer-retailer interaction in product management that rely on theoretical methods with limited scenarios (such as involving only one manufacturer and one retailer, or one manufacturer and two retailers), this research employs consumer purchase data to identify product strategies and quantify sales performance. Moreover, we involve numerous prominent manufacturers and retailers in the category to align with the escalating competition in the market.

The findings of these two essays in this dissertation reveal that retailers' decisions regarding product assortment not only directly impact manufacturers' sales through listing or delisting products but also influence the effectiveness of product attributes by shaping the competitive environment, encompassing all the products presented in the store.

4. Essay 2 - Marketing Actions Moderates the Effectiveness of Nutrition Claims on Brand Sales

Abstract

Food manufacturers frequently use nutrition claims to promote their products and encourage sales. Past research has found mixed results on consumers' responses to nutritional claims. We propose that the effect of a nutrition claim depends on the associated product marketing efforts. We empirically tested our hypotheses using sales of yogurt and cereal categories. We found a negative effect of market presence, indicating that over-presenting claims in the market leads to decreases in consumer preference. We also show that nutrition claims are more effective when the products are promoted with feature or in-store display. These findings suggest the dynamic nature of consumer preferences, highlighting the importance of access to real-time data for firms and policymakers and pointing to the possibility of a bottom-up approach in policymaking.

Keywords: Nutrition Claims, Sales, Food Products, Food Marketing

Introduction

Consumers worldwide struggle with weight management and face serious health issues due to obesity and other chronic diseases. Aiming to encourage a healthy diet, the consumer packaged goods industry has applied food labeling techniques to address regulation changes as well as to differentiate their products from the competition (Food and Drug Administration 2006). One of these labeling techniques is using a nutrition claim (NC) which either describes the level of a nutrient in the product using terms such as "free," "high," and "low," or compares the level of a nutrient in a food item to that of another food item, using terms such as "more," "reduced," and "lite" (Food Standards 2016). NCs must be approved by Food and Drug Administration (FDA) regulation to ensure that descriptive terms such as low or high are meaningful to consumers with consistent standards for different food categories. Aiming to aid the interpretation of nutrient table and health benefits and to avoid misleading information, NCs have been widely adopted by manufacturers across nations and product categories. For example, researchers find 46% of pre-packaged foods in Canada carry at least one NC (Franco-Arellano et al. 2017) and 69% in the US (Cao and Yan 2016).

Although there has been an ever-increasing consumer demand for a healthier diet (Andrews et al. 2014; Chrysochou and Grunert 2014), the findings on consumers' responses to NCs are mixed. Some studies find consumers perceive these products as healthier (Roe, Levy and Derby 1999), have a more favorable attitude toward them (Kozup, Creyer, and Burton 2003), and are willing to pay a premium price for them (Ballco, Jurado and Gracia 2020). Conversely, a growing body of studies has highlighted the negative impact of nutrition claims. This stream of work has revealed that NCs could lead to decreased perceived tastiness (Civille and Oftedal 2012; Raghunathan, Naylor, and Hoyer 2006), consumer skepticism (Garretson and Burton 2000),

negative evaluations, and lower purchase intentions due to confusion and misleading information (Benson et al. 2018; Williams 2005).

While many papers attempt to address these mixed results with factors such as variations of claim type (e.g. André, Chandon and Haws 2019) or consumer characteristics (e.g. Cavaliere, De Marchi and Banterle 2016), the impact of marketing activities has been overlooked. First, the effectiveness of NCs on sales is likely to be negatively influenced by the over presentation of the claims in the market due to the wear-out effect of advertising messages (Craig, Stemthal and Leavitt 1976) and scarcity theory (Brock 1968). In addition, a rich body of work has confirmed a critical role of the retail environment in healthy food consumption (for a review, see Cameron et al. 2016). 'Price' (e.g. subsidies), 'Place' (e.g. store display), and 'Promotion' (e.g. shelf-label and tasting booth) are commonly used interventions in order to promote healthier purchases. However, the existing research often neglects the retail environment which leads to the inconsistency between what consumers report in the experiments and what they do on real shopping occasions (Ballco de-Magistris and Caputo 2019). Our research takes retail marketing into account and examines the role of price, feature or display promotion, and discounts on NC effectiveness.

We aim to address how marketing actions influence the effectiveness of nutrition claims, more specifically: (1) Whether the increasing market-level presence of products with NCs improves or impairs NC effectiveness? and (2) To what extent is NC effectiveness influenced by marketing-mix changes and the competition among products with NCs and their regular counterparts?

We address these questions by measuring the effectiveness of various NCs over four years with scanner data. The advantage of using scanner data is two-fold. First, there is increasing evidence that what consumers say about their preference for NC is inconsistent with what they

purchase (Ballco et al. 2019). For example, despite an increasing self-reported trend of a healthy diet and well-being (Block et al. 2011; Chrysochou and Grunert 2014), only 10 to 30% of new nutritious food products survive in the market for over two years (Bimbo et al. 2017). As opposed to survey reports or household panel data, the scanner is free of self-report errors and less vulnerable to sample selection bias (Sriram, Balachander and Kalwani 2007). Researchers have demonstrated the use of panel purchase data to study the impact of a nutrition scoring system (Nikolova and Inman 2015) or the effect of household characteristics on soda versus cereal purchase (Ma, Ailawadi and Grewal 2013). We are one of the first to examine NCs' impact. Second, the point-of-sales data allows us to capture the impacts of retail marketing strategies and marketing presence on NC effectiveness.

In the rest of the article, we will first review the relevant literature on NC's effectiveness. Then we present our methodology and describe our data and variable operationalizations. Next, we show our empirical results and discuss the managerial and policy implications of our research. Finally, we provide limitations and future research directions.

Literature Review

Nutrition Claim and Its Effectiveness

Broadly speaking, the literature on NCs has two major streams (see Table 1 for key articles). The first stream looks at the direct impact of NCs on consumers' preferences and choices. Just after nutrition labeling became mandatory conduct in the 90s (e.g. Caswell et al. 2003), the majority of the literature focused on examining the effectiveness of such practices. As supplements to nutrition panels, NCs aim to ease the interpretation of the panel by conveying food content information (e.g. low fat) that would otherwise remain hidden. They attract consumers' attention and aid consumers

to make better-informed product decisions (e.g. Verbeke 2005), which advances public healthy eating in general (e.g. Ippolito and Mathios 1991, 1993). In addition, NCs as a form of advertising communicate the added value of nutritional benefits which may be translated to long-term brand value (Cao and Yan 2016). For the above reasons, NCs have been proved to foster more positive consumer responses in term of attitude (Kozup et al. 2003), nutrition content evaluation (Andrews Netemeyer and Burton 1998), and willingness to pay a premium price (Ballco et al. 2020). In contrast, some studies also reveal negative impacts of NCs. One major cause is that healthiness tends to be associated with inferior taste which leads to lower purchase intention for healthy food (Bialkova, Sasse and Fenko 2016). Raghunathan et al. (2006) confirmed an explicit belief in the intuition that consumers believe unhealthy equals tasty. Three follow-up experiments suggest that healthier foods are perceived as not tasty, less enjoyable during consumption, and less preferred in a choice task. A second mechanism is consumer skepticism (Garretson and Burton 2000). Some consumers believe that claims are advertising messages controlled by the manufacturers to sell more of their products. This skepticism means that when consumers suspect that there exists a persuasion attempt, they tend to overlook or substantially discount the information (Friestad and Wright 1994).

Table 4-1 Key Findings on the Effectiveness of NCs

Source	Focus	Category	Method	Findings
Roe et al. 1999	Main effect	Cereal, lasagna frozen dinner, yogurt	Experiments	Positive health claims create a halo effect regarding other attributes like good taste.
Kozup et al. 2003	Main effect	Restaurant menus and frozen lasagna	Experiments	There are positive effects of nutrition information on packaged goods and restaurant menus.
Garretson and Burton 2000	Main effect	Frozen dinner	Experiments	Claims did not affect nutrition or brand attitudes or purchase intentions when the nutrition fact table is presented.

Cao and Yan 2016	Main effect	7,313 food and beverage products	Empirical	The degree of nutritional emphasis and the specificity of nutrition claims increase firm performance.
Bialkova et al. 2016	Main effect	Cereals and chips	Experiments	Health benefit reduces taste perception and purchase intention
André et al 2019	Moderation effect: types of claims	Cereals	Experiments	Claim type influences perceptions on taste, healthiness, and dieting.
López-Galán and de-Magistris 2019	Main effect & moderation effect: consumer heterogeneity	Toast	Experiments	Emotional eating decreases the effectiveness of nutrition claims
Steinhauser et al. 2019	Moderation effect: consumer heterogeneity	Juice	Experiments	Consumers with high motivation and knowledge gaze longer at claims
This study	Moderation effect: marketing	Yogurt and cereals	Empirical	

To find the boundaries of the effectiveness of NCs, a second research stream explores moderators such as claim types (e.g. André et al., 2019) and consumer heterogeneity (e.g. Naylor, Droms and Haws 2009). The former is related to the categorization of claim types such as valence and specificity. Generally, a negative attribute such as fat, fatty acid, calories, sugar, cholesterol, or sodium receives more attention than positive attributes such as calcium or vitamins (Balasubramanian and Cole 2002). In addition, the framing of an attribute significantly shapes healthiness and taste expectations. According to Levin and Gaeth (1988), beef was perceived and tasted to be leaner when framed as “75% lean” versus “25% fat” in the claim. Both specific claims and general health claims are effective (Raghunathan et al., 2006) and lead to consumer overgeneralization and misinterpretation (Andrews et al., 1998). In a recent study, researchers identified four types of claims that are commonly used in the market: “removing negatives” (e.g. low fat), “adding positives” (e.g. high fiber), “not adding negatives” (e.g. all natural), and “not

removing positives" (e.g. no additives) (André et al., 2019). They find that adding is perceived to be healthier and tastier than "removing."

Research also explores the moderation impacts of various consumer heterogeneity. Consumers with more nutrition knowledge and/or higher health motivation tend to spend longer time reviewing nutrition and health claims (Steinhauser et al. 2019). On the other hand, when both claims and nutrition fact panels are presented, consumers with low health orientation are more interested in claims whereas the nutrition facts panel is sufficient for highly health-oriented consumers (Cavaliere et al. 2016). Researchers also find that emotional eating decreases the preferences towards products with nutrition claims (López-Galán and de-Magistris 2019).

The Moderating Effects of Marketing Actions on NC's Effectiveness

Food marketers adopt nutrition claims as competitive attributes to persuade consumers, especially the ones concerned about health (Nestle 2007). Such attributes have been adopted by the majority of food brands quickly in order to secure companies' competitive positions. According to Legault et al. (2004), more than 80% of bottled water, snacks, granola bars, and trail mixes make at least one claim. However, such conduct can backfire when the same message has been repeatedly used by almost all players in the market. This wear-out effect has been well documented in the literature attributable to consumers' inattention to the information and reactance to substantial repetition levels (Craig, Stemthal and Leavitt 1976). In addition, although manufacturers wish to build a competitive advantage with a larger portfolio of healthy products, the scarcity theory suggests that more value is attached to scarce objects than abundant objects (Brock, 1968). Scarce products attract consumers through mechanisms such as psychological reactance, need for uniqueness, and heuristic inferences of value based on availability (Zhu and

Ratner 2015). Therefore, the increasing market-level presence of the same NC will lead to a decrease in its effectiveness.

H_1: As the relative number of SKUs carrying the NC in the market increases, the effectiveness of NCs decreases.

The majority of food purchases occur in retail stores, and it is well known that the store environments have a critical impact on purchase decisions (Steenkamp and Gielens 2003). A rich line of work has focused on different types of retail interventions to improve population diet. Cameron and colleagues (2016) conducted a systematic review of the effectiveness of grocery store interventions. They used the '4Ps' to categorize the categories of nutrition-related interventions. 'Product' includes increasing healthy food options. 'Promotion' could be non-interactive interventions such as shelf labels or interactive ones such as taste testing. Both aim to promote healthy products and educate consumers with nutrition knowledge. 'Place' involves changing store display or product positioning, and 'price' can include discounts or subsidies. Among the 50 studies reported in the paper, 70% reported positive intervention effects on promoting healthier consumption, which suggests the important role of retail marketing in consumers' diet outcomes. The marketing activities are summarized to encourage a better diet by increasing availability, affordability, prominence, and promotion of healthy options (Glanz, Bader, and Iyer 2012). However, the majority of research that investigates NC effectiveness uses an experiment set-up (see Table 1), providing limited insights on how marketing moderates the effect. There has been a call for research to test the results of marketing interventions in real-world settings (Glanz et al., 2012). With the scanner data, we empirically study the impact of price and feature or display promotion on NC effectiveness.

Consumers are often uncertain about the quality of products, especially for intangible product attributes. The price level is found to be one of the most important external cues that signals quality and benefits (Dodds, Monroe, and Grewal 1991; Hughner et al. 2007) whose relative impact is stronger than advertising (Erdem and colleagues, 2008). A high price can be interpreted as either demand-related information, such as high demand for superior quality, or supply-related information, such as high production costs associated with high quality (Gerstner 1985). A line of consumer research confirms that consumers believe that as a product's price increases, its quality increases commensurately, i.e. "you get what you pay for" (e.g. Kardes et al. 2004; Lalwani and Shavitt 2013). For instance, using a conjoint model, Gianni et al. (2002) concluded that consumers believe an organic olive oil to be not "truly" organic if the price is lower than a threshold. Multiple studies confirm that the premium price of organic products compared to conventionally grown food leads to the belief that organic food is healthier (Hill and Lynchenhaun 2002). As price is elaborated as the value of inputs used in the manufacturing process (Tellis and Wernerfelt 1987), the value and effectiveness of a NC should be stronger if the average price of products carrying the NC is higher than products without the NC.

H_{2a}: Price differences between products with and without a NC will increase the effectiveness of the NC.

Retail advertising is another frequently used promotion strategy that includes feature advertising where retailers advertise in the store flyer or newspapers, and in-store displays. Unlike the nutrition information panel, nutrition claims are typically shown on the front of the product package, where retail promotion can improve the claims' visibility and make it more prominent to consumers (Mehta, Rajiv and Srinivasan 2003). Such repeated exposure to a nutrition claim increases the liking of the claim through mere exposure effect which has been documented in the

psychology literature for over 50 years (Zajonc, 1968). Moreover, Mrkva and VanBoven (2020) advance the theory and suggest that the mere exposure effect is largely attributable to salience as opposed to absolute exposure. According to their theory, repeated exposure of a nutrition claim makes it stand out from the surroundings and increases the evaluation of the claim subsequently. Repeated exposure also influences evaluative extremity and emotional intensity (Mrkva and VanBoven, 2020). In addition, feature advertising also helps to increase attention paid to nutrition claims. Steinhauser et al's eye tracking experiment shows that in a close-to-realistic shopping situation, the more attention and time spent on a nutrition claim, the more likely consumers will purchase the product (2019). Greater attention to a particular claim increases the prioritization and weight of the claim in consumers' evaluations as well as decision-making (Mrkva, Ramos & Van Boven, 2020).

H_{2b}: Feature advertising intensity differences between products with and without a NC will increase the effectiveness of the NC.

Modeling Approach

We allow the NC effectiveness to vary over time as a function of marketing strategies and market presence. Dynamic linear models have been shown to be well suited to deal with changes in parameters over time (Ataman et al. 2008; Van Heerde, Mela and Manchanda 2004). We used the R package Multivariate Autoregressive State-Space Modeling (MARSS) to estimate the results (Holmes et al. 2012) First, we specify the observation equation with a log-log model to capture the short-term effects of marketing and NCs on a brand's sales in a given chain. We include a set of Gaussian copula terms to account for potential endogeneity (Park and Gupta 2012).

$$(1)\ \overline{\ln SALES_{irt}} = \gamma_{it} + \alpha_1 \overline{\ln PRICE}_{irt} + \alpha_2 \overline{PROMO}_{irt} + \alpha_3 \overline{DISC}_{irt} + \alpha_4 \overline{LLH}_{irt} + \alpha_5 HOLIDAY_t + \sum_{j=1}^{J} \beta_t^j NC_{irt}^j + \delta_1 CO\_PRICE_{irt} + \sum_{j=1}^{J} \varphi_j CO\_NC_{irt}^j + w_{irt}$$

where *i, r, t* stand for the brand, chain, and week of observation, respectively. The dependent variable is the log-sales of brand *i* in chain *r* in week *t*. γ_{it} is a time-varying intercept that represents brands' baseline sales. PRICE is defined as the brands' average price in cents per serving. PROMO is the percentage of a brand's SKUs that are either on feature or display. We combine feature and display into one variable for its parsimoniousness. As reported in Bucklin and colleagues (1998) and Drèze and Bell (2003), these variables contain somewhat redundant information. Next, following Ailawadi, Kopalle, and Neslin (2005), we define a product as on discount when the net price is more than 5% lower than the maximum price paid in the previous four weeks and the following four weeks. Then, DISC is defined as the percentage of the brands' products that are on discount for that week. Lastly, LLH represents line length which is the total number of unique SKUs of the brand. This variable controls for the variety and shelf space of the brands. We control for the effect of public holidays using HOLIDAY.

NC_{it}^j is the percentage of products that carry the NC *j* (e.g. low fat) for brand i at week t. *w* is the error term that follows a multivariant normal distribution with retailer clustered variance. The coefficients α_1 to α_5 are the response parameters to price, feature or display promotion, discount, line length, and holiday dummy. β_t^j is the time-varying coefficient of nutritional claim j at week t, measuring the effectiveness of NCs. We estimate the effectiveness of different claims separately because researchers found consumers do not respond to NC in the same manner (e.g. André et al 2019).

We control for endogeneity of pricing and NC decisions (e.g., the percentage of SKUs to carry certain NC) with the Gaussian Copula terms CO_PRICE_{irt} and $CO\_NC^{j}_{irt}$. With this method, we directly model the joint distribution of the potentially endogenous regressors and the error term (Park and Gupta 2012). An identification requirement for the Gaussian Copula method is that the endogenous regressors are not normally distributed. Following Datta et al. (2017), we performed Shapiro-Wilk tests of the endogenous variables and rejected the normality for all ($p < 0.1$).

The overbar indicates standardization. All variables except for *HOLIDAY* (after taking logs, if applicable) are standardized for each time series to control for unobserved brand-chain specific fixed effects (Ataman et al. 2010).

Next, we explain the state equations.

$$(2)\quad \begin{bmatrix} \gamma_{1t} \\ \vdots \\ \gamma_{it} \end{bmatrix} = \lambda_0 \begin{bmatrix} \gamma_{1t-1} \\ \vdots \\ \gamma_{it-1} \end{bmatrix} + \begin{bmatrix} v_{01t} \\ \vdots \\ v_{0it} \end{bmatrix}$$

$$(3)\quad \begin{bmatrix} \beta_t^1 \\ \vdots \\ \beta_t^J \end{bmatrix} = \begin{bmatrix} \theta_0^1 \\ \vdots \\ \theta_0^J \end{bmatrix} + \theta_1 \begin{bmatrix} \beta_{t-1}^1 \\ \vdots \\ \beta_{t-1}^J \end{bmatrix} + \rho \begin{bmatrix} \overline{PRSC_t^1} \\ \vdots \\ \overline{PRSC_t^J} \end{bmatrix} + \mu_1 \begin{bmatrix} \overline{PRICE\_PREM_t^1} \\ \vdots \\ \overline{PRICE\_PREM_t^J} \end{bmatrix}$$
$$+ \mu_2 \begin{bmatrix} \overline{PROMO\_PREM_t^1} \\ \vdots \\ \overline{PROMO\_PREM_t^J} \end{bmatrix} + \mu_3 \begin{bmatrix} \overline{DISC\_DIFF_t^1} \\ \vdots \\ \overline{DISC\_DIFF_t^J} \end{bmatrix} + \begin{bmatrix} v_{1t}^1 \\ \vdots \\ v_{1t}^J \end{bmatrix}$$

Equation 2 captures the carry-over effect of brand sales with λ_0 representing the repeat purchase rate.

Equation 3 models the effectiveness of NC J (β_t^J). We define the market presence and marketing actions by contrasting the difference between products with claim j and products without claim j. More specifically, $PRSC_t^j$ represents the market presence and is calculated by the total number of unique SKUs with claim j minus the total number of unique SKUs without claim j, at week t. $PRICE\_PREM_t^j$ is the average price of products with claim j minus those without claim j at week t. $PROMO\_PREM_t^j$ is the percentage of products with claim j that are on feature or display promotion minus those without claim j at week t. $DISC\_DIFF_t^j$ is a control variable that is the percentage of products with claim j that are on discount minus those without claim j, at week t. θ_0 is a vector of intercepts that represent the baseline effectiveness of NCs. θ_1 is the decay rate of NC effect which is constrained to be within 0 to 1. ρ is the impact of market presence. When ρ is positive, NCs are more effective when there are more products in the market that carry them. When ρ is negative, the effectiveness decreases as manufacturers overuse the claim. μs is the effect

of marketing actions. When μ is positive, the marketing actions increase the effectiveness of NCs, whereas when μ is negative, the marketing actions benefit the products without NCs.

Again, we standardize the independent variables to allow the parameters to capture the time-varying marketing activities. We assume all *v*s are independently distributed. Table 2 lists our key variables and their operationalizations.

Table 4-2 Data Operationalization

	Variable	Operationalization
Observation Equation	lnPRICE	Log transform of mean average price in cents per serving [175 g]
	PROMO	The percentage of a brand's SKUs that are either on feature or display
	DISC	The percentage of products that are on discount
	LLH	The total number of unique SKUs
	No/Low Fat	The percentage of products with no fat or low fat claim
	Vitamin/Mineral	The percentage of products with vitamin/mineral claim
	Low Sugar	The percentage of products with low sugar claim
	Protein	The percentage of products with high protein claim
	Fibre	The percentage of products with fibre claim
State Equation	PRSC	The difference of total number of SKUs between products with claim j and products without claim j
	PRICE_PREM	The difference of average price per serving between products with claim j and products without claim j
	PROMO_PREM	The difference of feature or display intensity between products with claim j and products without claim j
	DISC_DIFF	The difference of discount intensity between products with claim j and products without claim j

Data

We obtained weekly sales data from A.C. Nielsen in Montreal, Canada from 2010 to 2013. The four-year window of our data provides strong insights into the evolution of NC effectiveness. We aggregated the data to the chain level, following Ataman et. al. (2010). Then we supplemented this data with new product release data (named 'Product Launch Analytics') from Datamonitor,

which contains NC label information (e.g. Ng and Popkin 2012). Two coders were trained to match the products in the two datasets based on product descriptions and UPC code. We investigated the yogurt and cold cereal categories, both of which are frequently used in food labeling literature (e.g. Roe et al. 1999).

Yogurt Category

The yogurt category has experienced rapid growth in the last two decades. For example, the average purchase was 3.17L per year in 1996 for Canadians but became 10.53L in 2015 (Canadian Dairy Information Centre 2016). The category is perceived as healthy as a whole and manufacturers have been dedicated to creating healthier choices with added nutrients such as vitamins (Chandan 2011). Our analysis of the yogurt category is based on three mature brands of 5 major retailers that account for over 86% of sales in the category. We focus on popular claims (over 10% presence) so we can properly identify their effects: no/low fat (38%), vitamin/mineral (24%), low sugar (16%), and protein (15%). These claims are frequently examined in the NC literature.

Cereal Category

Unlike yogurt, the cereal market has been rather stagnant and perceived as an unhealthy product category. However, there has been a significant transformation since the continuous updates in packaging rules such as the Nutrition and Labelling and Education Act of 1990 (Ivanova, Kurp and Hampe 2020). Major manufacturers have adapted to this through product reformulation or new product lines by adding protein content, highlighting fiber content, decreasing sugar, or removing artificial flavors and colors (Schaeffer 2015). We focused on the 3 major brands and 5 major retailers, which account for 83% of sales in the cold cereal category. Applying the same 10% presence rule, we focus on the top 3 claims: no/low fat (37%), high fiber (35%), and

vitamin/mineral (23%). More detailed descriptions are in Tables 3 and 4. We show the evolution of average NC presence over time in Figure 1.

Table 4-3: Descriptions of the Data: Summary Statistics

	Yogurt				Cereal			
Variable	**Mean**	**SD**	**Min**	**Max**	**Mean**	**SD**	**Min**	**Max**
PRICE	16.19	2.29	10.89	23.13	48.22	7.51	33.07	70.74
PROMO	0.15	0.16	0.00	0.97	0.16	0.17	0.00	0.92
DISC	0.37	0.21	0.00	1.00	0.33	0.23	0.00	0.98
LLH	43.65	15.42	10.00	75.00	31.35	13.12	9.00	61.00
No/Low Fat	0.38	0.13	0.25	0.56	0.37	0.27	0.00	0.73
Vitamin/Mineral	0.24	0.21	0.00	0.50	0.23	0.15	0.00	0.55
Low Sugar	0.16	0.08	0.00	0.27				
Protein	0.15	0.12	0.00	0.44		/		
Fibre		/			0.35	0.09	0.19	0.64
PRSC	-70.79	40.02	-143.00	-13.00	-33.39	8.59	-50.00	-19.00
PRICE_PREM	-1.30	1.26	-3.62	2.70	-2.37	1.80	-6.91	4.45
PROMO_PREM	0.00	0.07	-0.29	0.23	0.00	0.08	-0.24	0.31
DISC_DIFF	0.02	0.09	-0.34	0.29	0.01	0.10	-0.36	0.26

Table 4-4: Descriptions of the data: Correlations

Yogurt									
		1	2	3	4	5	6	7	8
Observation Model	1. PRICE	1.00	-0.57						
	2. PROMO	-0.57	1.00						
	3. DISC	-0.69	0.51	1.00					
	4. LLH	0.38	-0.19	-0.21	1.00				
	5. No/Low fat	0.00	-0.03	-0.02	-0.16	1.00			
	6. Vitamin/Mineral	0.29	-0.08	-0.14	0.52	0.07	1.00		
	7. Low_Sugar	0.09	-0.10	-0.09	0.24	0.48	-0.07	1.00	
	8. Protein	0.14	-0.02	-0.06	0.01	0.64	0.56	0.03	1.00
		1	2	3	4				
State Model	1. PRSC	1.00							
	2.PRICE_PREM	-0.33	1.00						
	3.PROMO_PREM	0.16	-0.46	1.00					
	4.DISC_DIFF	0.04	-0.50	0.49	1.00				
Cereal									
		1	2	3	4	5	6	7	
Observation Model	1.PRICE	1.00							
	2.PROMO	-0.37	1.00						
	3.DISC	-0.67	0.38	1.00					
	4.LLH	-0.21	-0.05	0.25	1.00				
	5.No/Low fat	0.18	0.05	-0.08	-0.22	1.00			
	6.Vitamin/Mineral	-0.24	0.00	0.14	0.17	-0.11	1.00		
	7.Fibre	-0.19	-0.04	0.12	0.15	0.03	0.66	1.00	
		1	2	3	4				
State Model	1.PRSC	1							
	2.PRICE_PREM	0.32	1						
	3.PROMO_PREM	0.06	-0.36	1					
	4. DISC_DIFF	0.02	-0.61	0.67	1				

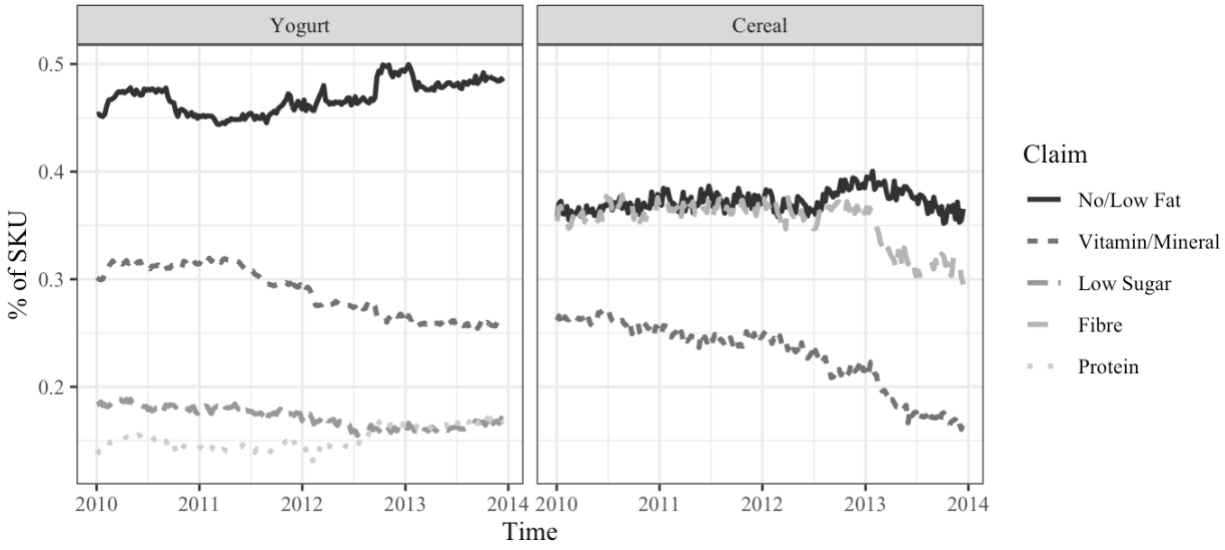

Figure 4-1 The evolution of SKUs with NC

Results and Discussion

We estimate the same model separately for cereal and yogurt. Table 5 shows the estimations of the key parameters. First, we find consistent results across the two categories for the observation model. Similar to the existing literature (e.g. Atman et al. 2010), we find that price and holiday coefficients are negatively significant and promotion, discount, and line length coefficients are positively significant. Overall, the results of the observation equation allow us to control for the short-term effect of brands' marketing mix. In addition, we find high repeat purchase rates in both categories ($\lambda_{0\ yogurt} = 0.955$, 95%CI [0.93, 0.98); $\lambda_{0\ crereal} = 0.906$, 95%CI [0.86, 0.96)) which is as expected given that both yogurt and cereal are frequent purchase products.

Table 4-5: Empirical Results

	Yogurt				Cereal		
Variables	Coef.	SE	95%CI	**Variables**	Coef.	SE	95%CI
Price	-1.050	0.08	[-1.21, -0.88]	**Price**	-0.91	0.05	[-1.01, -0.81]
Promotion	0.112	0.01	[0.09, 0.14]	**Promotion**	0.109	0.01	[0.09, 0.13]
Discount	0.091	0.02	[0.06, 0.12]	**Discount**	0.067	0.01	[0.04, 0.09]
Line_Length	0.270	0.05	[0.18, 0.36]	**Line_Length**	0.265	0.02	[0.23, 0.30]
Holiday	-0.218	0.03	[-0.28, -0.16]	**Holiday**	-0.094	0.03	[-0.14, -0.05]
Intercept_Brand 1	-0.020	0.01	[-0.05, 0.01]	**Intercept_Brand 1**	-0.003	0.01	[-0.02, 0.02]
Intercept_Brand 2	0.001	0.01	[-0.02, 0.02]	**Intercept_Brand 2**	0.001	0.01	[-0.01, 0.01]
Intercept_Brand 3	0.000	0.01	[-0.02, 0.02]	**Intercept_Brand 3**	0.009	0.01	[-0.02, 0.03]
Carry-over_Brand Sales	0.955	0.01	[0.93, 0.98]	**Carry-over_Brand Sales**	0.906	0.03	[0.86, 0.96]
Intercept_Low/no fat	0.005	0.00	[-0.00, 0.01]	**Intercept_Low/no fat**	-0.006	0.00	[-0.01, 0.00]
Intercept_Vitamins	0.007	0.00	[-0.00, 0.02]	**Intercept_Vitamins**	0.000	0.00	[-0.01, 0.01]
Intercept_Low sugar	-0.001	0.00	[-0.01, 0.00]	**Intercept_Fiber**	0.005	0.00	[0.00, 0.01]
Intercept_Protein	-0.001	0.00	[-0.01, 0.01]	/			
Carry-over_NC Effectiveness	0.953	0.03	[0.90, 1.00]	**Carry-over_NC Effectiveness**	0.909	0.03	[0.85, 0.97]
Market Presence	-0.003	0.00	[-0.01, -0.00]	**Market Presence**	-0.005	0.00	[-0.01, -0.00]
Price Premium	0.004	0.00	[-0.00, 0.01]	**Price Premium**	0.008	0.00	[-0.00, 0.02]
Promotion Premium	0.003	0.00	[-0.00, 0.01]	**Promotion Premium**	0.011	0.01	[0.00, 0.02]
Discount Difference	0.002	0.00	[-0.00, 0.01]	**Discount Difference**	0.001	0.01	[-0.01, 0.01]
Copula_Price	0.455	0.08	[0.29, 0.62]	**Copula_Price**	0.308	0.05	[0.21, 0.40]
Copula_Low/no fat	-0.020	0.05	[-0.13, 0.08]	**Copula_Low/no fat**	-0.032	0.01	[-0.06, -0.01]
Copula_Vitamins	-0.071	0.03	[-0.14, -0.00]	**Copula_Vitamins**	-0.042	0.04	[-0.12, 0.04]

Copula_Low sugar	0.102	0.05	[0.01, 0.19]	**Copula_Fiber**	-0.001	0.03	[-0.07, 0.07]
Copula_Protein	-0.018	0.02	[-0.05, 0.01]				

As for the effectiveness of NCs, the baseline effectiveness parameters of the NCs are mostly insignificant with the exceptions that fiber is positively significant for cereal (θ_0 = 0.005, 95%CI [0.00, 0.01]). However, the time-varying parameters of NCs are significant for certain periods. Table 6 lists the mean effectiveness of NCs over 4 years and the percentage of positively or negatively significant parameters.

Table 4-6: Summary Statistics of NCs effectiveness

Category	Claim	Mean Coefficient	% pos sig	% neg sig	Max Difference
Yogurt	No/Low Fat	0.130	48%	0%	0.307***
	Vitamin/Mineral	0.149	61%	0%	0.286***
	Low Sugar	0.000	34%	29%	0.326***
	Protein	-0.022	6%	0%	0.450***
Cereal	No/Low Fat	-0.071	2%	23%	0.396***
	Vitamin/Mineral	-0.001	20%	12.6%	0.468***
	Fibre	0.045	58%	24%	0.368***

*:p<0.1; **:p<0.05;***:p<0.01

We find support for hypothesis H1 in both categories. The impact of relative market presence on the effectiveness of NCs is negatively significant (ρ_{yogurt} = -0.003, 95%CI [-0.01,-0.00]; $\rho_{crereal}$ = -0.005, 95%CI [-0.01,-0.00]). It suggests that consistent across two product categories and five different types of NC (low/no fat, vitamin/mineral, low sugar, protein, fiber), there is a satiation effect because consumers perceive less value from the claims as manufacturers continuously increase their usage of them. There are multiple mechanisms that can explain such an effect. First, this is related to the advertising wear-out effect (Craig et al. 1976). In addition, when most of the products in the market carry the same claim, they will not provide differentiation

and a competitive advantage for the brand. According to the scarcity theory (Brock 1968), more value is attached to an NC when it is rare in the market.

For H2a, the results are directionally consistent with our prediction in both categories ($\mu_{1;\,yogurt}$ = 0.004, 95%CI [-0.00,0.01]; $\mu_{1;\,cereal}$ = 0.008, 95%CI [-0.00,0.02]). Price premium of products with a nutrition claim is likely to signal higher quality and leads to more positive evaluation but not at a significant level. H2b is supported by the cereal category results (μ_2 = 0.011, 95% CI [0.00,0.02]), while only directionally supported by the yogurt category results (μ_2 = 0.003, 95% CI [-0.00,0.01]). Higher intensity of feature advertising of a claim is likely to strengthen the evaluation and liking of the claim. The claim becomes more salient and consumers spend more attention on the claim.

Implications

Using a novel approach, this research empirically examines the impact of market actions on the effectiveness of NCs on brand sales. First, our results show a negative impact of relative market presence. This negative relationship suggests a satiation effect of NCs such that overusing them would create a wear out effect, lower the value of these claims to consumers. This finding underlines the importance of tailoring the product introduction strategies based on a careful understanding of the needs and motives of the consumers rather than relying on general trends like the preference for healthiness.

Second, our results highlight the moderating role of marketing activities on the effectiveness of nutrition claims. Our findings confirm that the effectiveness of NCs is strengthened by more feature and display promotion for the products that carry these claims. We also find an insignificant but directionally positive effect of price premium. These findings suggest

the dynamic nature of consumer preference and highlight the importance of access to real-time data and the bottom-up approach in evaluating the role of marketing activities.

Marketing Implications

Our research highlights the importance of understanding the moderation impact of marketing actions on NC effectiveness. Our findings inform manufacturers on the satiation effect in NC communication such that if an NC has been widely adopted in the market, adding the NC to their new product is not likely to provide additional competitive advantages. An NC would be more effective when it's not so common within the category. It suggests that firms should not only focus on their own product lines but also consider all products available for consumers. Trying to catch up with competitors by introducing the same claim/health benefit might not be the most efficient strategy as the effectiveness of claims declines when it wears out and loses its value for consumers. Marketers need to look for new opportunities by investing in R&D to create more innovative health benefits which may help marketers to mitigate the wear out effect of NC claims and appeal to consumers.

Moreover, while most of the current literature focuses on understanding the role of moderators such as consumer heterogeneity (e.g. López-Galán and de-Magistris 2019) and claim types (e.g. André et al 2019), we point out the importance of marketing strategies such as feature and display promotion. There has been increasing evidence that consumers do not behave the same way as they say they do in terms of purchasing nutritious food (Ballco de-Magistris and Caputo 2019). Using sales data, our paper shows how consumers perceive NCs with the presence of marketing mix in the real world. The results show that NC effectiveness is dependent on the relative promotion intensity of products with claims compared to products without claims. Feature

and display are significantly helpful to increase the exposure to NCs and increase consumers' preferences for the products that carry these claims.

Policy Implications

The dynamics in NC effectiveness have multiple implications for policymakers. First of all, our results underline the importance of identifying the differences of NCs across food categories. The current regulations on NCs are typically developed by the type of claims and are not sensitive to the food categories. For example, the updates by the European Commission (2012) focused on a detailed definition of the level of nutrients contained, to use "low" or "high" claims. On one hand, our results on NC effectiveness confirm the differential response to various types of claims. For example, the average effect in the yogurt category is strongest for Low/No Fat and Vitamin/Mineral claims but is almost nonexistent for Low Sugar and High Protein claims. We also find differences in the same claim across product categories. For instance, a No/Low fat claim is found to be mostly positive for the yogurt category but mostly negative for the cereal category. Such differential reactions to claims across categories are consistent with prior research using an eye-tracking technique that finds nutrition claims are more preferred for the orange juice category than the milk chocolate category (Steinhauser et al., 2019). These results indicate the importance of further tailoring the policy strategies to different food categories.

In addition, manufacturers have been dedicated to providing a more health-conscious environment for consumers. For instance, Legault et al. (2004) found that over 80% of bottled water, snacks, granola bars, and trail mixes made at least one claim. However, there are drawbacks to such excessive claiming. Our results show that the increasing presence of NCs will, in fact, decrease the effectiveness of NCs. The regulators and policymakers could help improve this wear-out effect by imposing stricter and more detailed claim instructions to limit the number of products

with claims in the market. This is particularly important in the absence of strict regulations on NCs. For example, recent research finds that 42% of packaged food and beverages carrying nutrition claims were ineligible to carry the claims in Canada (Franco-Arellano et al. 2017). Imposing stricter policies on NCs will not only increase the credibility of the claims but also make these claims more attractive and valuable for consumers' purchase decisions.

Lastly, while regulators use a top-down approach by imposing various food policies such as The Nutritional Labeling and Education Act 25 years ago, the world is still struggling to curb the obesity epidemic (Nikolova and Inman 2015). Lencucha et al. (2018) suggest the government play a catalyst role, in addition to the traditional regulator role. For instance, governments can leverage their information and communication technologies to monitor the usage of nutrition claims and provide timely updates. These updates could include the quality of the products with claims, the comparison among different brands, as well as the response from consumers. Such information would then feed into actions to maintain the effectiveness of NCs.

To conclude, this is the first study to account for the moderation effects of marketing actions on the effectiveness of nutrition claims (NCs). There has been a call for research to analyze how the use of nutrition information is related to market response as most extant studies focus on consumer use and understanding of nutrition labels (Glanz et al., 2012). This research fills in the gap by quantifying the moderation effects of marketing presence and marketing mix. The results reveal a negative impact of relative marketing presence on the effectiveness of NCs on brand sales. It suggests that the adoption of a widely used NC will not provide extra competitive advantages for the brand. An NC is more effective when it's scarce in the market. Marketers should focus on health benefit innovations to appeal to consumers. Policymakers may help mitigate this wear-out effect by imposing stricter and more detailed standards which reduces the competition in the

market. Secondly, the impact of marketing strategies such as price and feature and display promotion has been overlooked in the extant literature. We find that differences in promotion intensity between NC products and regular/no-NC options increase the effectiveness of NCs. Our results highlight how the retailer environment could shape consumers' preferences for NCs. Policymakers should take such effects into account.

Limitations and Future Research

The are several limitations of the study and opportunities for future research. First, we do not include household-level analysis due to data limitation. Future research may use individual analysis to investigate important differences in responses to nutritional claims across households. For example, high fiber may be more important to the older demographic. Secondly, we used the most frequently used claims in the analysis for parsimonious purposes. The state space enlarges exponentially by adding more time-varying parameters (Ataman et al. 2010). Future researchers may distinguish consumers' responses and the impact of marketing activities on the well-known claims versus relatively rare and new claims. We tested several non-linear models of the moderation effect and do not find improvement in model fit. Including new claims could help improve the variation of the data and uncover any non-linear patterns. Lastly, researchers may further examine the advertising effect. There is a stream of work (e.g. Chrysochou and Grunent 2014) that focuses on advertisement messages that convey health and nutrition benefits. Researchers could investigate the short- and long-term impacts of these messages on NC effectiveness.

References

Ailawadi, Kusum L., Praveen K. Kopalle, and Scott A. Neslin (2005), "Predicting competitive response to a major policy change: Combining game-theoretic and empirical analyses," *Marketing Science,* 24(1), 12-24.

André, Quentin, Pierre Chandon, and Kelly Haws (2019), "Healthy through presence or absence, nature or science?: a framework for understanding front-of-package food claims," *Journal of Public Policy & Marketing,* 38(2), 172-191.

Andrews, J. Craig, Lin, Chung-Tung Jordan, Levy, Alan S., Lo, Serena (2014), "Consumer Research Needs from the Food and Drug Administration on Front-of-Package Nutritional Labeling," *Journal of Public Policy & Marketing*, 33 (1), 10–16.

Andrews, J. Craig, Richard G. Netemeyer, and Scot Burton (1998), "Consumer generalization of nutrient content claims in advertising," *Journal of marketing*, 62(4), 62-75.

Ataman, M. Berk, Carl F. Mela, and Harald J. Van Heerde (2008), "Building brands," *Marketing Science*, 27(6), 1036-1054.

Ataman, M. Berk, Harald J. Van Heerde, and Carl F. Mela (2010), "The long-term effect of marketing strategy on brand sales," *Journal of Marketing Research*, 47(5), 866-882.

Balasubramanian, Siva K., and Catherine Cole (2002), "Consumers' search and use of nutrition information: The challenge and promise of the nutrition labeling and education act," *Journal of marketing*, 66(3), 112-127.

Ballco, Petjon, Francesc Jurado, and Azucena Gracia (2020), "Do health claims add value to nutrition claims? Evidence from a close-to-real experiment on breakfast biscuits," *Food Quality and Preference,* 85, 103968.

Ballco, Petjon, Tiziana de-Magistris, and Vincenzina Caputo (2019), “Consumer preferences for nutritional claims: An exploration of attention and choice based on an eye-tracking choice experiment,” *Food Research International*, 116, 37-48.

Benson, Tony, Fiona Lavelle, Tamara Bucher, Amanda McCloat, Elaine Mooney, Bernadette Egan, Clare E. Collins, and Moira Dean (2018), “The impact of nutrition and health claims on consumer perceptions and portion size selection: results from a nationally representative survey,” *Nutrients,* 10(5), 656.

Bialkova, S., Sasse, L., & Fenko, A. (2016). The role of nutrition labels and advertising claims in altering consumers' evaluation and choice. *Appetite,* 96, 38-46.

Bialkova, Svetlana, Lena Sasse, and Anna Fenko (2016), “The role of nutrition labels and advertising claims in altering consumers' evaluation and choice,” *Appetite,* 96, 38-46.

Bimbo, Francesco, Alessandro Bonanno, Giuseppe Nocella, Rosaria Viscecchia, Gianluca Nardone, Biagia De Devitiis, and Domenico Carlucci (2017), “Consumers’ acceptance and preferences for nutrition-modified and functional dairy products: A systematic review,” *Appetite,* 113, 141-154.

Block, Lauren G., Sonya A. Grier, Terry L. Childers, Brennan Davis, Jane EJ Ebert, Shiriki Kumanyika, Russell N. Laczniak et al. (2011), “From Nutrients to Nurturance: A Conceptual Introduction to Food Well-Being,” *Journal of Public Policy & Marketing,* 30 (1), 5.

Brock Timothy C. (1968), “Implications of Commodity Theory for Value Change,” in *Psychological Foundations of Attitudes*, New York: Academic Press, 243–75.

Bucklin, Randolph E., Sunil Gupta, and Saurabh Siddarth (1998), "Determining segmentation in sales response across consumer purchase behaviors," *Journal of Marketing Research*, 35(2), 189-197.

Cameron, Adrian J., Emma Charlton, Winsfred W. Ngan, and Gary Sacks (2016), "A systematic review of the effectiveness of supermarket-based interventions involving product, promotion, or place on the healthiness of consumer purchases," *Current Nutrition Reports*, 5(3), 129-138.

Canadian Dairy Information Centre (2016), "Per Capita Consumption of Dairy Products" (accessed October 19, 2020), http://www.dairyinfo.gc.ca/pdf/dpconsumption_e.pdf

Canadian Foundation for Dietetic Research (2013), "Tracking Nutrition Trends VIII" (accessed October 19, 2020), https://www.cfdr.ca/Downloads/Presentations/Pasut-presentation.aspx

Cao, Zixia, and Ruiliang Yan (2016), "Health creates wealth? The use of nutrition claims and firm financial performance," *Journal of Public Policy & Marketing,* 35(1), *58-75.*

Caswell, Julie A., Yumei Ning, Fang Liu, and Eliza M. Mojduszka (2003), "The impact of new labeling regulations on the use of voluntary nutrient-content and health claims by food manufacturers," *Journal of Public Policy & Marketing*, 22(2), 147-158.

Cavaliere, Alessia, Elisa De Marchi, and Alessandro Banterle (2016), "Does consumer health-orientation affect the use of nutrition facts panel and claims? An empirical analysis in Italy," *Food Quality and Preference,* 54, 110-116.

Chandan, Ramesh C. (2011), Dairy Ingredients for Food Processing. Oxford, UK: Wiley-Blackwell.

Chase, Darren, John Paul Emunu, Tomas KH Nilsson, Diane McCann-Hiltz, and Yanning Peng (2009), "Canadian consumers' purchasing behavior of omega-3 products," *Journal of Food Distribution Research,* 40, 12-25.

Chrysochou, Polymeros, and Klaus G. Grunert (2014), "Health-related ad information and health motivation effects on product evaluations," *Journal of Business Research,* 67(6), 1209-1217.

Civille, Gail Vance, and Katherine Nolen Oftedal (2012), "Sensory evaluation techniques—Make "good for you" taste "good"," *Physiology & Behavior,* 107(4), 598-605.

Cleeren, K., Geyskens, K., Verhoef, P. C., & Pennings, J. M. (2016). Regular or low-fat? An investigation of the long-run impact of the first low-fat purchase on subsequent purchase volumes and calories. *International Journal of Research in Marketi*ng, 33(4), 896-906.

Craig, C. Samuel, Brian Sternthal, and Clark Leavitt (1976), "Advertising wearout: An experimental analysis," *Journal of Marketing Research,* 13(4), 365-372.

Datta, H., Ailawadi, K. L., & Van Heerde, H. J. (2017). How well does consumer-based brand equity align with sales-based brand equity and marketing-mix response?. *Journal of Marketing*, 81(3), 1-20.

Dodds, William B., Kent B. Monroe, and Dhruv Grewal (1991), "Effects of price, brand, and store information on buyers' product evaluations," *Journal of marketing research,* 28(3), 307-319.

Drèze, Xavier, and David R. Bell (2003), "Creating win–win trade promotions: theory and empirical analysis of scan-back trade deals," *Marketing science,* 22(1), 16-39.

Erdem, Tülin, Michael P. Keane, and Baohong Sun (2008), "A dynamic model of brand choice when price and advertising signal product quality," *Marketing Science,* 27(6), 1111-1125.

Escaron, Anne L., Amy M. Meinen, Susan A. Nitzke, and Ana P. Martinez-Donate (2013), "Supermarket and grocery store-based interventions to promote healthful food choices and eating practices: a systematic review," *Preventing chronic disease,* 10, E50.

European Commisson (2012), "Nutrition Claims" (accessed October 19, 2020), https://ec.europa.eu/food/safety/labelling_nutrition/claims/nutrition_claims_en

Food and Drug Administration (2006), "Code of federal regulations. Title 21 - food and drugs. Part 101.9 - nutrition labeling" (accessed October 19), 2020https://www.gpo.gov/fdsys/pkg/CFR-2008- title21-vol2/xml/CFR-2008-title21-vol2-part101.xml.

Food Standard. (2016), "Nutrition content claims and health claims" (accessed October 19), https://www.foodstandards.gov.au/consumer/labelling/nutrition/pages/default.aspx#:~:text=Nutrition%20content%20claims%20are%20claims,or%20good%20source%20of%20calcium.&text=General%20level%20health%20claims%20refer,for%20healthy%20bones%20and%20teeth

Franco-Arellano, Beatriz, Jodi T. Bernstein, Sheida Norsen, Alyssa Schermel, and Mary R. L'Abbé (2017), "Assessing nutrition and other claims on food labels: A repeated cross-sectional analysis of the Canadian food supply," *BMC nutrition,* 3(1), 1-16.

Friestad, Marian, and Peter Wright (1994), "The persuasion knowledge model: How people cope with persuasion attempts," *Journal of consumer research,* 21(1), 1-31.

Garretson, Judith A., and Scot Burton (2000), "Effects of nutrition facts panel values, nutrition claims, and health claims on consumer attitudes, perceptions of disease-related risks, and trust," *Journal of Public Policy & Marketing,* 19(2), 213-227.

Gerstner, Eitan (1985), "Do higher prices signal higher quality?" *Journal of marketing research,* 22(2), 209-215.

Gianni, C., Teresa, D. G., & Riccardo, S. (2002). Consumers' perception of quality in organic food. A random utility model under preference heterogeneity and choice correlation from rank-orderings. *British Food Journal, 104*(3-5), 200-213.

Glanz, Karen, Michael DM Bader, and Shally Iyer (2012), "Retail grocery store marketing strategies and obesity: an integrative review," *American journal of preventive medicine,* 42(5), 503-512.

Helene, H., & Fidelma, L. (2002). Organic milk: attitudes and consumption patterns. *British Food Journal, 104*(7), 526-542.

Holmes EE, Ward EJ, Wills K (2012). "MARSS: Multivariate autoregressive state-space models for analyzing time-series data." The R Journal, 4(1), 30.

Hughner, R. S., McDonagh, P., Prothero, A., Shultz, C. J., & Stanton, J. (2007). Who are organic food consumers? A compilation and review of why people purchase organic food. *Journal of Consumer Behaviour: An International Research Review*, *6*(2-3), 94-110.

Inman, J. Jeffrey, Russell S. Winer, and Rosellina Ferraro (2009), "The interplay among category characteristics, customer characteristics, and customer activities on in-store decision making," *Journal of Marketing,* 73(5), 19-29.

Ippolito, Pauline M., and Alan D. Mathios (1991), "Health claims in food marketing: Evidence on knowledge and behavior in the cereal market," *Journal of Public Policy & Marketing*, 10(1), 15-32.

Ippolito, Pauline M., and Alan D. Mathios. (1993), "New food labeling regulations and the flow of nutrition information to consumers," *Journal of Public Policy & Marketing,* 12(2), 188-205.

Ivanova, Albena, Jill Kurp, and Austin Hampe (2020), "The Value of Front-of-Package and Point-of-Purchase Summaries in the Cold Cereal Industry," *Journal of Food Products Marketing*, 26(8), 545-563.

Kardes, Frank R., Maria L. Cronley, James J. Kellaris, and Steven S. Posavac (2004), "The role of selective information processing in price-quality inference," *Journal of Consumer Research*, 31(2), 368-374.

Kozup, John C., Elizabeth H. Creyer, and Scot Burton (2003), "Making healthful food choices: the influence of health claims and nutrition information on consumers' evaluations of packaged food products and restaurant menu items," *Journal of Marketing*, 67(2), 19-34.

Lalwani, Ashok K., and Sharon Shavitt (2013), "You get what you pay for? Self-construal influences price-quality judgments," *Journal of Consumer Research*, 40(2), 255-267.

Legault, Lori, Brandt, Mary Bender, McCabe, Nancie, Adler, Carole, Brown, Anna-Marie, Brecher, Susan (2004), "2000–2001 Food Label and Package Survey: An Update on Prevalence of Nutrition Labeling and Claims on Processed, Packaged Foods," *Journal of the American Dietetic Association*, 104 (6), 952–58.

Lencucha, Raphael, Laurette Dubé, Chantal Blouin, Anselm Hennis, Mauricio Pardon, and Nick Drager (2018), "Fostering the catalyst role of government in advancing healthy food environments," *International journal of health policy and management,* 7(6), 485.

Levin, Irwin P., and Gary J. Gaeth (1988), "How consumers are affected by the framing of attribute information before and after consuming the product," *Journal of consumer research,* 15(3), 374-378.

López-Galán, B., & De-Magistris, T. (2019). Testing emotional eating style in relation to willingness to pay for nutritional claims. *Nutrients*, 11(8), 1773.

Ma, Yu, Kusum L. Ailawadi, and Dhruv Grewal (2013), "Soda versus cereal and sugar versus fat: drivers of healthful food intake and the impact of diabetes diagnosis," *Journal of Marketing,* 77(3), 101-120.

Mehta, Nitin, Surendra Rajiv, and Kannan Srinivasan (2003), "Price uncertainty and consumer search: A structural model of consideration set formation," *Marketing science,* 22(1), 58-84.

Mrkva, K., & Van Boven, L. (2020). Salience theory of mere exposure: Relative exposure increases liking, extremity, and emotional intensity. *Journal of Personality and Social Psychology*, *118*(6), 1118.

Mrkva, K., Ramos, J., & Van Boven, L. (2020). Attention influences emotion, judgment, and decision making to explain mental simulation. *Psychology of Consciousness: Theory, Research, and Practice*, *7*(4), 404.

Naylor, Rebecca Walker, Courtney M. Droms, and Kelly L. Haws (2009), "Eating with a purpose: Consumer response to functional food health claims in conflicting versus

complementary information environments," *Journal of Public Policy & Marketing*, 28(2), 221-233.

Nestle, Marion (2007), *Food Politics: How the Food Industry Influences Nutrition and Health (2nd ed.)*. Berkeley: University of California Press.

Ng, Shu Wen, and Barry M. Popkin (2012), "Monitoring foods and nutrients sold and consumed in the United States: dynamics and challenges," *Journal of the Academy of Nutrition and Dietetics*, 112(1), 41-45.

Nikolova, Hristina Dzhogleva, and J. Jeffrey Inman (2015), "Healthy choice: the effect of simplified point-of-sale nutritional information on consumer food choice behavior," *Journal of Marketing Research*, 52(6), 817-835.

Park, S., & Gupta, S. (2012). Handling endogenous regressors by joint estimation using copulas. *Marketing Science*, 31(4), 567-586.

Raghunathan, Rajagopal, Rebecca Walker Naylor, and Wayne D. Hoyer (2006), "The unhealthy= tasty intuition and its effects on taste inferences, enjoyment, and choice of food products," *Journal of Marketing*, 70(4), 170-184.

Roe, Brian, Alan S. Levy, and Brenda M. Derby (1999), "The impact of health claims on consumer search and product evaluation outcomes: results from FDA experimental data," *Journal of Public Policy & Marketing*, 18(1), 89-105.

Schaeffer, Juliann (2015), "Breakfast Cereal Innovations," *Today's Dietitian*, 17(3), 36.

Sriram, Srinivasaraghavan, Subramanian Balachander, and Manohar U. Kalwani (2007), "Monitoring the dynamics of brand equity using store-level data," *Journal of Marketing*, 71(2), 61-78.

Steenkamp, Jan-Benedict EM, and Katrijn Gielens (2003), "Consumer and market drivers of the trial probability of new consumer packaged goods," *Journal of Consumer Research,* 30(3), 368-384.

Steinhauser, J., Janssen, M., & Hamm, U. (2019). Consumers' purchase decisions for products with nutrition and health claims: What role do product category and gaze duration on claims play? *Appetite*, 141, 104337.

Steinhauser, J., Janssen, M., & Hamm, U. (2019). Who buys products with nutrition and health claims? A purchase simulation with eye tracking on the influence of consumers' nutrition knowledge and health motivation. *Nutrients*, 11(9), 2199.

Talukdar, Debabrata, and Charles Lindsey (2013), "To buy or not to buy: Consumers' demand response patterns for healthy versus unhealthy food," *Journal of Marketing*, 77(2), 124-138.

Tellis, Gerard J., and Birger Wernerfelt (1987), "Competitive price and quality under asymmetric information," *Marketing science,* 6(3), 240-253.

Van Heerde, Harald J., Carl F. Mela, and Puneet Manchanda (2004), "The dynamic effect of innovation on market structure," *Journal of Marketing Research,* 41(2), 166-183.

Verbeke, Wim (2005), "Agriculture and the food industry in the information age," *European review of agricultural economics*, 32(3), 347-368.

Williams, Peter (2005), "Consumer understanding and use of health claims for foods," *Nutrition reviews,* 63(7), 256-264.

Zajonc, R. B. (1968). Attitudinal effects of mere exposure. *Journal of Personality and Social Psychology*, 9, 1–27.

Zhu, Meng, and Rebecca K. Ratner (2015), “Scarcity polarizes preferences: The impact on choice among multiple items in a product class,” *Journal of Marketing Research,* 52(1), 13-26.

5. General Discussion and Conclusion

This chapter concludes the current thesis by summarizing its findings, reviewing general contributions, providing recommendations for marketers and policymakers, and discussing limitations and suggestions for future research.

This research discusses product management at the dynamic interface between manufacturers and retailers. In the second chapter, we review the academic background in product management, the development of retailers' and manufacturers' power balance, the product related interactions between manufacturers and retailers, and product decisions under competitive dynamics. We identify three major gaps in the existing literature: the lack of discussion in channel interaction between manufacturers' products and retailers' assortment decisions, the lack of focus in product removal under channel dynamics, and the lack of understanding of how the effectiveness of products' attribute innovation change over time with the dynamic interplay of retailers and manufacturers shaping the competitive dynamics.

The two essays in this dissertation contribute to the literature by empirically investigating the effect of retailer and manufacturer product strategies on sales. The first essay examines the influence of product delisting, a commonly employed strategy in the progressively competitive retail industry, on manufacturers' sales. More specifically, we analyze the different strategies used by manufacturers and retailers to remove products from the market. Our findings show that when manufacturers remove a product from the market, known as product elimination, it has no effect on their sales. However, when retailers remove a product from their shelves, known as product delisting, it has a negative impact on manufacturers' sales, at both aggregate and individual levels. The adverse impact is particularly significant for frequent consumers of discontinued products. Nevertheless, it can be alleviated by enhancing the similarity within the brand and the dissimilarity

across different brands. This enables consumers to easily replace their purchases with alternative products offered by the same brand. The second essay empirically investigates how retailers' marketing tactics moderate the impact of product attributes on brand sales, specifically focusing on the instance of nutritional claims. Our findings indicate that the level of market presence has a detrimental impact, suggesting a potential saturation effect of nutrition claims. Furthermore, we demonstrate that in-store marketing activities such as display and feature promotion enhance the effectiveness of nutrition claims.

The thesis contributes to both theory and practice, and the following sections discuss these implications in detail.

5.1 Theoretical Implications on Manufacturer-Retailer Interaction Literature

While there is research on the use of various marketing strategies such as promotion (Jeuland & Shugan 2008; Moorthy, 2005), pricing (Cosguner et al., 2017; Liu and Zhang 2006), or the introduction of private labels (Chintagunta et al., 2002; Pauwels & Srinivasan, 2004) as sources of leverage when manufacturers and retailers bargain with each other, scant attention has been paid to how manufacturers and retailers interact on product or assortment management (Ailawadi et al., 2010). On one hand, these insights are crucial for manufacturers in the fast-changing business landscape, where retailers are gaining power by launching private labels and implementing an omnichannel strategy. Numerous studies have shown shifts in bargaining power due to the launch of one private label (e.g., Chintagunta et al. 2002), and there exists a trend for retailers to own two to three private labels ranging from economic (cheap price; low quality) and standard (somewhat cheap price; comparable quality to national brands), to premium brands (high price; high quality with added value) (Hökelekli, 2017). On the other hand, the rapid expansion of e-commerce has compelled corporations to restructure their distribution networks in order to

capitalize on the benefits presented by e-commerce (Tahirov & Glock, 2022). Exploring product and assortment management in a channel is critical for retailers to overcome the challenge of this direct-to-consumer business model and improve customer loyalty in order to maintain their market position.

This dissertation contributes to the current understanding of marketing research by examining the interdependency of manufacturer and retailer product decisions and measuring the magnitude of these impacts through empirical investigations. Unlike most studies on manufacturer-retailer interaction in product management, which employ theoretical methods with limited scenarios (such as involving only one manufacturer and one retailer, or one manufacturer and two retailers), this research utilizes consumer purchase data to identify product strategies and quantify sales performance. In addition, we allow the participation of numerous prominent manufacturers and retailers in the category which comply with the increasing competition in the market. The results of two essays in this dissertation demonstrate that retailers' assortment decisions have significant impacts not only directly on manufacturers' sales through listing or delisting the products, but also on the effectiveness of product attributes by shaping the competitive environment, which includes all of the products presented in the store.

5.2 Theoretical Implications on Product Management Literature

5.2.1 Product Removal

This research expands upon existing product management research, which predominantly concentrates on product innovations, by highlighting the importance of product removals and the role of retailers. To thrive in today's rapidly evolving and competitive marketplace, businesses must effectively manage their brand and product portfolios, not only including the creation or acquisition of new brands/products and the management of existing brands/products, but also the

deletion of underperforming brands/products. The removal of a brand or product is a crucial but challenging decision for businesses, including manufacturers and retailers. Through a bibliometric review of existing literature, Zhu et al. (2021) point out that the topic of product removal deserves greater academic research attention, especially theory development, due to the dispersed nature of studies in this field.

The existing body of product management literature extensively examines four distinct forms of product unavailability: out-of-stock, assortment reduction, brand delisting, and conflict delisting. These forms differ from the concept of product removal discussed in the first essay of this dissertation in various ways, such as in extent of impact, duration, and frequency of occurrence (Breugelmans et al., 2018). The first essay centers on the concept of product removal, which is characterized by its permanence, in contrast to temporary out-of-stock situations. Product removal can be initiated by either retailers or producers, distinguishing it from assortment reduction and brand delisting. Furthermore, product removal occurs with greater frequency than conflict delisting.

Additionally, the predominant body of study on product unavailability mostly examines its impact on retailers. For instance, researchers have discussed the impact of out-of-stock items on consumers' store perception (Kim & Lennon, 2011), the short- and long-term effects of assortment reduction on category sales (Dreze et al., 1994), perceptions of variety (Broniarczyk et al., 1998), or store loyalty (Oppewal & Koelemeijer, 2005). How product unavailability impacts manufacturers is equally important and yet has been neglected in the literature. The outcomes of product elimination are crucial for future evaluations of other products in the same line, the design of new products, and the tuning of customer management strategies in case of dissatisfaction. The consequences of product delisting are also critical for the power battle between manufacturers and retailers. On one hand, manufacturers can reflect if the product is well-designed, well-priced, and

placed in the right location when retailers plan to delist it. On the other hand, manufacturers must be aware of the power dynamic between themselves and retailers and avoid being sabotaged by the retailers.

This dissertation contributes to the literature by zooming in on the consequences of product removal on the manufacturers and providing managerial implications on how to mitigate them. First, we distinguish between two types of product removal. The first type is product delisting, which is initiated by retailers and potentially more detrimental to manufacturer brands, whereas the other is product elimination, typically launched by the brands to decrease excessive product diversity or allocate production capacity more efficiently. Our research shows that while both product elimination and product delisting result in permanent product unavailability for customers, the impact on sales differs. We find that manufacturers' decisions to eliminate a product do not affect sales, yet when retailers choose to delist a product, it negatively impacts manufacturers' sales at both aggregate and individual levels. This disparity implies that it is crucial to not just analytically distinguish between the two processes, but also to perceive them as stemming from fundamentally distinct sets of decision-making factors. Unlike the meticulous research and implementation process involved in product elimination, product delisting disregards the potential downsides for manufacturers and consumers. It is employed as a tactic to divert focus onto store brands.

The dissertation enhances the existing knowledge by identifying factors that moderate the effects of product deletions. To minimize the adverse consequences of delisting, companies can enhance the similarity of products within their brand and increase the dissimilarity between different brands. This will enable customers to easily replace their purchases with alternative products supplied by the same brand. However, the impact of both deletion and delisting can be

predicted by considering consumer demand for the product that has been withdrawn. Heavy users experience discontent with both elimination and delisting, while uncommon users see a favorable benefit from elimination. The presence of diverse characteristics among individuals emphasizes the significance of tailoring communication and managing client relationships on an individual basis.

5.2.2 The time-varying effect of nutritional claims with the dynamic interplay of retailers and manufacturers

The pricing literature in marketing suggests that retailers not only use their bargaining power to directly negotiate better wholesale pricing and trade allowances (Buzzell et al., 1990), but also to influence the level of price competition among manufacturers (Draganska & Klapper, 2007), which indirectly impacts manufacturers' pricing and sales. Such an indirect role of retailers has been neglected in the product related literature. The second essay fills in this gap by focusing on the function food market and studying the effectiveness of nutrition claims, one of the more common nutrition labeling methods adopted by food manufacturers worldwide.

Health-related attributes, particularly in functional products, have garnered significant attention. Despite extensive discussions on these attributes, empirical findings at the firm or brand level have been scattered throughout the literature. Two large scale empirical studies (Nikolova & Inman, 2015; Maesen et al., 2022) utilized natural experiments when new retailer or government policies took effect. Other empirical studies employed event study methods and focused on the impact of firm value (Cao & Yan, 2016; Hanson & Yun, 2018).

This research introduces a novel approach to studying the effectiveness of nutrition-related attributes over time, contributing to a more comprehensive understanding of their impact on firms. Moreover, it examines how consumers react differently when evaluating a single product versus

multiple alternatives, addressing a gap in existing studies that primarily focused on noncomparative contexts (Newman et al., 2014). By exploring the dynamic interplay between retailers and manufacturers in influencing the effectiveness of product attribute innovation, this research provides a more realistic retail setting for evaluating the impact of health-related attributes in a comparative context. Our findings show that the effectiveness of nutrition claims decreases as retailers list more products with such claims. Excessive exposure of the same product attribute (in our case, a nutrition claim) would produce a wear-out effect, which reduces the value of the attribute to customers. Additionally, we show that retailers' marketing actions also moderate the preference of the attributes. By contrasting the level of marketing intensity between products with and without an attribute, we find feature and display promotion significantly impact the effectiveness of the attributes.

5.3 Managerial Insights

5.3.1 Product Differentiation

The results of both essays demonstrate the strategic significance of product differentiation and assortment for both manufacturer and retailer. In the case of product delisting, one straightforward question the managers face is how to make sure consumers do not choose their substitution outside the brand. The literature on out-of-stock tests the impact of recommending other products as substitutes (Ku et al., 2017). Consumers are more inclined to take the suggested product when the alternative shares the dominant attributes of the unavailable item (Hoang & Breugelmans, 2022). Ultimately, customer satisfaction hinges on whether product substitutions meet their needs and expectations; an alternative product must be perceived as nearly equivalent to the original selection and whenever possible, substitute products should align with the price and quality of the original, but tiered based on various factors, such as product feature (Gupta et al.,

2021). The results from Essay 1 resemble the findings in Hoang and Breugelmans (2022) and suggest that when more similar products exist within the focal brand and less similar products are offered by competing brands, the negative impact of product delisting can be mitigated. Put another way, consumers will be more devoted to a brand and less likely to switch to a new one when product delisting happens if the products are both more unique from competing brands and more similar within the brand.

In addition, the results in Essay 2 suggest that the effectiveness of a product attribute decreases as more products in the store carry it. As the market becomes saturated with several products bearing the same feature, the distinguishing and competitive advantage that the attribute once provided progressively fades because consumers may experience sensory overload (Malhotra, 1984). The abundance of alternatives with the same attribute might dilute the attribute's perceived worth (Brock, 1968). In such cases, consumers may find it difficult to distinguish between items, resulting in a reduced emphasis on the once-prominent attribute. Furthermore, increased competition among products sharing the same attribute can result in a commoditization effect (Reimann et al., 2010). When numerous options are available, customers may consider the attribute as a standard feature. This shift in perception weakens the attribute's ability to influence purchasing decisions, as buyers would prioritize other criteria or seek more innovative and original characteristics to differentiate their options.

5.3.2 Targeted Marketing and Communication

The findings in Essay 2 demonstrate the important role that retailers' product offerings and marketing initiatives play in forming the local competitive landscape, which then has an impact on the success of product innovations and effectiveness of product attributes. To cater to local preferences, retailers often modify their product assortments rather than only making national-

level judgments due to the heterogeneous nature of the marketplace. Macy's, for example, has acknowledged that a "one size/style fits all" strategy is insufficient and has worked to tailor at least 15% of the products in each of its stores to local tastes (Mantrala et al., 2009). Furthermore, because the lowest efficient scale of retailer distribution networks is typically equivalent to a state's surface area (Ellickson, 2007), standardizing assortment between states is less cost-effective than standardizing assortment within states, resulting in larger across-state assortment variances. Hwang et al. (2010) empirically confirm such disparities among states, as well as provided evidence of store differentiation with local brands aimed at appealing to consumers' regional tastes. However, manufacturers may often overlook the impact of these store-specific activities and only focus on the national distribution. The results of Essay 2 suggest that the relative intensity of in-store marketing such as feature and display significantly impacts the effectiveness of product attributes. Firms should expand their competitive focus beyond the national scale, recognizing the significance of regional and store-level competitions. In doing so, businesses can tailor their marketing strategies to cater to retailers' assortment localization.

Apart from the diversities in retailers and stores, it is also important to recognize the diversities of consumers. In the case of product unavailability, for example, researchers stress the variations in consumer response. Gázquez-Abad et al. (2021) investigate the role of 14 consumer characteristics in their decision to switch stores or not in the case of brand delisting. They find that while geographical (US or Spain) and demographic (e.g., income and education) factors have some effect on consumers' store switching intentions, whether or not their favorite brands are delisted is one of the strongest drivers. Fitzsimons (2000) finds that stock-out has a positive impact on low-commitment customers' satisfaction due to decreased choice difficulty but significantly induces dissatisfaction for high-commitment customers. The results in Essay 1 are consistent with the

literature and show that customer preference towards the removed product is important in predicting the effect of both elimination and delisting.

Therefore, it is crucial to consider consumer heterogeneity for success of the mitigation actions. As Verhoef and Sloot (2009) show in their experiments, a notification of stock-out presented to all customers in the store can backfire by drawing non-buyers' attention to the stock-out situation and damaging customer perception. Implementing a targeted compensation plan can be more successful in minimizing the adverse consequences of removal and preserving favorable connections with unaffected consumers.

Prior research on product unavailability in different settings has examined how to address the issue by employing direct communication to prevent inconveniencing disinterested customers. For instance, Kim and Lennon (2011) find that regardless of what compensation was offered by the retailer to customers whose orders couldn't be fulfilled due to stockouts, any evidence showing that the company cared about customers' feelings in this situation helped to prevent negative emotions. This can be simply adopted by providing highly involved customers with the opportunity to give their thoughts and feedback. For example, Trade Joe's allows its customers to fill out the "Discontinued Product Feedback" form about the products they miss and claims that:

"Our mission is to bring you the best quality products at the best prices. To do this, we have to manage our store space smartly. If a product is not earning its spot on our shelves, then we discontinue it to make room for something new. We do not enter into the decision to discontinue a product lightly. We understand that it can be disappointing – devastating, even. We are Trader Joe's customers too, afterall. With that in mind, we welcome you to share your thoughts about a product you miss. We make no guarantees, but we do take customer requests into account when we develop new products or revisit old favorites." (Trader Joe's, 2023)

An effort similar to this would help companies recover customer trust and loyalty. In the case of elimination, research has shown that the perceived quality of the elimination process and outcome significantly influences customer satisfaction and loyalty (Homburg et al., 2010). Companies can employ customer relationship management systems to deliver tailored notifications, recommendations, or recompense to devoted customers of discontinued items. These messages have the potential to mitigate the psychological and economic burdens linked to the removal process.

In the case of delisting, brands can inform consumers that the products are still accessible through alternative distribution channels, with the aim of reducing customer attrition. They can also suggest substitute products that are available in the store based on their purchase history and the similarity between the delisted product and available products. Since initiators tend to be blamed more when delisting occurs (Hermans et al., 2024), managers can clearly mention in the communication that it is the retailer who initiates the decision to lessen the disappointment of the consumers.

5.4 Implications for Policy and Regulations

Several nations, such as the United Kingdom, Ireland, and Australia, have demonstrated through their initiatives that the implementation of Grocery Codes fosters a fair and competitive grocery retail sector. The use of this coding system is advantageous for all participants in the food supply chain, spanning from agricultural producers to consumers, ensuring that each party receives equitable treatment and opportunities. For instance, the Groceries Supply Code of Practice (GSCOP) used in the UK, which was introduced to improve the grocery market's dynamics, applies to all supply agreements between suppliers and designated retailers. These comprehensive codes govern various aspects of these agreements, including changes to the supply agreement, delayed

payments for goods, contributions to marketing costs, buyer visits, artwork, store refurbishments/openings, and staff hospitality. Furthermore, it also covers crucial elements such as payments for shrinkage/wastage, listing/distribution fees, promotions, payments for better product positioning, customer complaint charges, de-listing periods, and dispute resolution, ensuring a holistic approach to fair trading practices (Gov.UK, 2009).

Canada's inaugural grocery code of conduct is nearing completion with businesses and experts anticipating the final version. This eagerly awaited coding system, being prepared by the Grocery Industry Code of Conduct Steering Committee, aims to promote equity and openness in the grocery industry. Additionally, it seeks to establish a central repository of data that will enable Canadians to more easily access food pricing, thereby enhancing transparency and consumer trust in the market (O'Neill, 2023). Initially, major retailers like Loblaw and Walmart strongly opposed the implementation of the code, arguing that it could result in higher food costs and ultimately negatively impact consumers (Edmiston, 2023). However, in response to months of pressure from public interest groups and elected officials, Loblaw has recently declared its support of Canada's Grocery Code of Conduct (Loblaw Companies Limited, 2024). Full implementation of the Code of Conduct is expected in the near future.

The findings of this dissertation have significant implications for policymakers, highlighting the impact of retailer operations and assortment management on manufacturers. The first essay illustrates the importance of fair listing and delisting procedures in protecting manufacturer businesses from being exploited by large retailers. For instance, retailers should be regulated to provide clear justification and sufficient time for suppliers to address the removal of their products from the shelves. This transparency is vital for maintaining trust and cooperation between suppliers and retailers.

Furthermore, to ensure fair practices and protect suppliers, it is crucial to prohibit the unilateral modification of supply agreements and to establish clauses that specify the conditions under which grocers can impose penalties. These procedures can prevent retailers from threatening to delist products for price negotiation. An example of such regulation is the Competition and Consumer (Industry Codes—Food and Grocery) Regulation in Australia, which prohibits retailers and wholesalers from removing a supplier's food product from their inventory due to a complaint, concern, or disagreement brought by the supplier, thus ensuring that suppliers are not unfairly penalized or marginalized (Australian Government, 2021). Such regulation helps to maintain a fair playing field, where suppliers can operate without the fear of sudden and unjustified delisting.

The second essay shows that policymakers should not only consider the 1-1 relationship between retailers and suppliers but also the important role retailers play in shifting the competitive dynamics of the entire market. The code of conduct should also ensure that retailers do not engage in anti-competitive behaviors such as favoring certain suppliers without justifiable reasons, which could distort competition.

The formulation and implementation of a grocery code of behavior are complex and challenging in multiple ways. For instance, the process involves setting explicit detailed criteria for the permissible grounds for delisting, delineating the procedures for delisting, and outlining the protocols to be followed in the event of a disagreement arising from delisting. Such comprehensive guidelines ensure that the power dynamics between suppliers and retailers are balanced, fostering a fairer marketplace that protects smaller suppliers from potential exploitation by larger retail chains. However, questions such as “What specific criteria should be used to justify the listing or delisting of products?” or “How much time should be considered "sufficient" for suppliers to address issues before delisting occurs?” are difficult for all parties to agree on.

Ensuring that regulations are not only enacted but also effectively implemented and enforced is another challenge. This requires adequate resources, training for regulatory bodies, and cooperation from retailers and suppliers as well as setting up robust monitoring systems to track compliance with new regulations such as regular audits, anonymous reporting mechanisms, and swift action on violations.

Nevertheless, the suggested practices encourage transparency and accountability within the grocery industry, ultimately benefiting consumers through more consistent and fair pricing and availability of products.

5.5 Limitations and Future Studies

Our studies have several limitations. First of all, existing literature on channel power underscores the need of differentiating and understanding the distinct patterns that emerge among different retailers or manufacturers, particularly between dominant ones and their competitive fringes (e.g. Kolay & Shaffer, 2013). While the analysis of this research includes multiple retailers and manufacturer brands, our study does not delve into the effects of their relative power. The extant literature focuses on the how channel power influences retail and wholesale prices or bargaining power and positions (Ailawadi et al., 2010). Future research could build on this literature and expand to the impacts of channel power on other marketing efforts including product strategies such as listing and delisting. Although the direct measurement of power is challenging, researchers demonstrated that variables such as size of the firms, private label share, positioning, and assortment depth are correlated to channel members' relative power and thus can be used as proxies (Draganska et al., 2010). The mechanism is manufacturers wielding strong brands can tip the power balance in their favor, leveraging retailers' reliance on popular brands to drive store traffic (Shankar et al., 2012). Conversely, robust retailers hold sway in the power dynamic, given

their pivotal role in the distribution of manufacturers' brands (Dukes et al., 2009). For example, an empirical work on conflict delisting shows that the lowest-share brand may lose up to 14.2% market share during the delisting period, while the retailer gains 17.1%. These findings underline the value of channel power as a buffer when companies face adverse events such as conflict delisting (Van der Maelen et al., 2017). Future research can adopt similar measurement and study the moderation impacts of channel power on other product strategies.

Secondly, both essays use real-life scanner data and empirical methods. While such an approach contributes to the product management in the channel dynamics literature which is currently mostly theoretically focused as identified in the Chapter 2, it poses challenges to test the mechanisms of the consumer response. Future research could be enhanced by adopting an integrated approach that incorporates field or lab experiments conducted in a controlled environment. Sloot and Verhoef (2008), for example, conduct a study on the impact of brand delistings through a controlled online experiment and in-store shopper survey. They manipulate variables such as the size of assortment and the proportion of high-equity brands shown to respondents, allowing them to test the influence of delisted brands' equity on consumers' intention to switch stores. Gazquez-Abad et al. (2021) adopt a similar method and focused on the moderation role of consumer traits such as demographics and nationalities. Other mechanisms of interests could be investigated in a similar approach focusing on topics including but not limited to consumer response to product removals and perceptions of health attributes. Through the utilization of controlled experiments, researchers can thoroughly analyze and comprehend the complexities of proposed mechanisms in a controlled setting and offer significant insights into achieving marketing success subsequently.

Lastly, although we include both retailers and manufacturers in our research setting, we focus primarily on the performance of manufacturers and discuss managerial insights from manufacturers' perspectives. Unlike manufacturers, retailers aim to maximize category profits rather than just brand profits (Ailawadi et al. 2010). As a result, there is a significant body of literature on retail marketing that examines topics such as category assortment optimization (Sinha et al., 2013), the comparison of brand-by-brand management and category management (Hall et al., 2010), and adding consumer behavior insights to category management (Desrochers & Nelson, 2006; Gu & Wu, 2023). In addition, the growing prevalence of Internet commerce presents many obstacles to assortment management (Ratchford et al., 2022). For example, although the internet allows for a limitless number of products to be offered, expanding the number of products could potentially harm the sales of the retailer's core offerings. This would result in reduced efficiency in managing the variety of products and increased costs (Ma, 2016). The best multi-channel assortment integration approach depends on the type of retailers (Emrich et al. 2015). Subsequent studies can enhance these studies by employing a dual-perspective approach that takes into account the interplay between channels and the strategic actions of manufacturers. For instance, one may explore retailers' gains and losses in comparison to manufacturers' or question the impact of manufacturer and retailer product strategies on store loyalty. Perspectives like these contribute to a better understanding of the motives of retailer strategies and provide marketing insights for both retailers and manufacturers.

Reference list

Agnihotri, A., & Bhattacharya, S. (2022). TMT socio-demographic traits and employee satisfaction. *The International Journal of Human Resource Management*, *33*(9), 1719-1753.

Ailawadi, K. L. (2001). The retail power-performance conundrum: what have we learned?. *Journal of retailing*, *77*(3), 299-318.

Ailawadi, K. L., & Harlam, B. (2004). An empirical analysis of the determinants of retail margins: the role of store-brand share. *Journal of Marketing*, *68*(1), 147-165.

Ailawadi, K. L., & Keller, K. L. (2004). Understanding retail branding: Conceptual insights and research priorities. *Journal of Retailing*, 80(4), 331-342.

Ailawadi, K. L., Bradlow, E. T., Draganska, M., Nijs, V., Rooderkerk, R. P., Sudhir, K., ... & Zhang, J. (2010). Empirical models of manufacturer-retailer interaction: A review and agenda for future research. *Marketing Letters*, *21*, 273-285.

Ailawadi, K. L., Pauwels, K., & Steenkamp, J. B. E. (2008). Private-label use and store loyalty. *Journal of marketing*, *72*(6), 19-30.

Ailawadi, K. L., Zhang, J., Krishna, A., & Kruger, M. W. (2010). When Wal-Mart enters: How incumbent retailers react and how this affects their sales outcomes. *Journal of Marketing Research*, *47*(4), 577-593.

Al Muala, A. (2012). Assessing the relationship between marketing mix and loyalty through tourists satisfaction in Jordan curative tourism. *American academic & scholarly research journal*, 4(2), 7-23.

Alan, Y., Dotson, J. P., & Kurtuluş, M. (2017). On the competitive and collaborative implications of category captainship. *Journal of Marketing*, *81*(4), 127-143.

Alexander, R. S. (1964). The death and burial of "sick" products. *Journal of Marketing*, *28*(2), 1-7.

André, Q., Chandon, P., & Haws, K. (2019). Healthy through presence or absence, nature or science?: A framework for understanding front-of-package food claims. *Journal of Public Policy & Marketing*, *38*(2), 172-191.

Aschemann-Witzel, J., & Grunert, K. G. (2015). Influence of 'soft'versus 'scientific'health information framing and contradictory information on consumers' health inferences and attitudes towards a food supplement. *Food Quality and Preference*, *42*, 90-99.

Australian Government. (2021). *Competition and Consumer (Industry Codes—Food and Grocery) Regulation 2015*. (accessed Jan 21, 2024) https://www.legislation.gov.au/F2015L00242/latest/text

Avlonitis, G. J. (1983). The product-elimination decision and strategies. *Industrial Marketing Management*, *12*(1), 31-43.

Avlonitis, G. J. (1984). Industrial product elimination: major factors to consider. *Industrial Marketing Management*, *13*(2), 77-85.

Avlonitis, G. (1986). What type of product eliminations are likely to be successful. *Project Dropstat. Contemporary Research in Marketing*, 989-1007.

Avlonitis, G. J., & Argouslidis, P. C. (2012). Tracking the evolution of theory on product elimination: Past, present, and future. *The Marketing Review*, *12*(4), 345-379.

Avlonitis, George J., Susan J. Hart, and Nikolaos X. Tzokas. (2000). An analysis of product deletion scenarios. *Journal of Product Innovation Management: An International Publication of The Product Development & Management Association*, *17*(1), 41-56.

Baker, J., Parasuraman, A., Grewal, D., & Voss, G. B. (2002). The influence of multiple store environment cues on perceived merchandise value and patronage intentions. *Journal of marketing*, *66*(2), 120-141.

Bandyopadhyay, S., Rominger, A., & Basaviah, S. (2009). Developing a framework to improve retail category management through category captain arrangements. *Journal of Retailing and Consumer Services*, *16*(4), 315-319.

Barnett, W. P., & Freeman, J. (2001). Too much of a good thing? Product proliferation and organizational failure. *Organization Science*, *12*(5), 539-558.

Baskaran, K. (2018). The power of private label in retail market. *International Journal of Business Administration and Management Research*, *4*(3), 6-11.

Bauer, C. A. W., & Turčínková, J. (2020), Product elimination in german industrial companies: A comparison study with US and UK industrial companies, *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, *68*(3), 585-596.

Bauer, J. C., Kotouc, A. J., & Rudolph, T. (2012). What constitutes a "good assortment"? A scale for measuring consumers' perceptions of an assortment offered in a grocery category. *Journal of Retailing and Consumer Services*, *19*(1), 11-26.

Baum, J. A., & Korn, H. J. (1996). Competitive dynamics of interfirm rivalry. *Academy of Management journal*, *39*(2), 255-291.

Baum, J. A., & Korn, H. J. (1999). Dynamics of dyadic competitive interaction. *Strategic management journal*, *20*(3), 251-278.

Benson, T., Lavelle, F., Bucher, T., McCloat, A., Mooney, E., Egan, B., ... & Dean, M. (2018). The impact of nutrition and health claims on consumer perceptions and portion size selection: Results from a nationally representative survey. *Nutrients*, *10*(5), 656.

Besanko, D., Dubé, J. P., & Gupta, S. (2003). Competitive price discrimination strategies in a vertical channel using aggregate retail data. *Management Science*, *49*(9), 1121-1138.

Besanko, D., Dubé, J. P., & Gupta, S. (2005). Own-brand and cross-brand retail pass-through. *Marketing Science*, *24*(1), 123-137.

Bialkova, S., Sasse, L., & Fenko, A. (2016). The role of nutrition labels and advertising claims in altering consumers' evaluation and choice. *Appetite*, *96*, 38-46.

Bloom, P. N., & Perry, V. G. (2001). Retailer power and supplier welfare: The case of Wal-Mart. *Journal of Retailing*, *77*(3), 379-396.

Boatwright, P., & Nunes, J. C. (2001). Reducing assortment: An attribute-based approach. *Journal of marketing*, *65*(3), 50-63.

Bollinger, B., Liebman, E., Hammond, D., Hobin, E., & Sacco, J. (2022). Educational campaigns for product labels: Evidence from on-shelf nutritional labeling. *Journal of Marketing Research*, *59*(1), 153-172.

Borle, S., Boatwright, P., Kadane, J. B., Nunes, J. C., & Galit, S. (2005). The effect of product assortment changes on customer retention. *Marketing science*, *24*(4), 616-622.

Bowman, D., & Gatignon, H. (1995). Determinants of competitor response time to a new product introduction. *Journal of marketing Research*, *32*(1), 42-53.

Breugelmans, E., Gijsbrechts, E., & Campo, K. (2018). Product unavailability. *Handbook of Research on Retailing; Gielens, K., Gijsbrechts, E., Eds*, 202-219.

Broniarczyk, S. M., Hoyer, W. D., & McAlister, L. (1998). Consumers' perceptions of the assortment offered in a grocery category: The impact of item reduction. *Journal of marketing research*, *35*(2), 166-176.

Burke, M. C. (1984). Strategic choice and marketing managers: an examination of business-level marketing objectives. *Journal of Marketing Research*, *21*(4), 345-359.

Buzzell, R. D., & Quelch, J. A. (1990). The costly bargain of trade promotion. *Harvard Business Review*, *68*(2), 141-149.

Cachon, G. P., Terwiesch, C., & Xu, Y. (2005). Retail assortment planning in the presence of consumer search. *Manufacturing & Service Operations Management*, 7(4), 330-346.

Cameron, A. J., Charlton, E., Ngan, W. W., & Sacks, G. (2016). A systematic review of the effectiveness of supermarket-based interventions involving product, promotion, or place on the healthiness of consumer purchases. *Current Nutrition Reports*, *5*, 129-138.

Candi, Marina (2010), "Benefits of aesthetic design as an element of new service development," *Journal of Product Innovation Management*, *27*(7), 1047-1064.

Cao, Z., & Yan, R. (2016). Health creates wealth? The use of nutrition claims and firm financial performance. *Journal of Public Policy & Marketing*, *35*(1), 58-75.

Chandy, R., Hopstaken, B., Narasimhan, O., & Prabhu, J. (2006). From invention to innovation: Conversion ability in product development. *Journal of Marketing Research*, *43*(3), 494-508.

Chen, M. J., & MacMillan, I. C. (1992). Nonresponse and delayed response to competitive moves: The roles of competitor dependence and action irreversibility. *Academy of Management Journal*, *35*(3), 539-570.

Chernev, A. (2003). When more is less and less is more: The role of ideal point availability and assortment in consumer choice. *Journal of consumer Research*, *30*(2), 170-183.

Chernev, A., Böckenholt, U., & Goodman, J. (2015). Choice overload: A conceptual review and meta-analysis. *Journal of Consumer Psychology*, *25*(2), 333-358.

Chintagunta, P. K., Bonfrer, A., & Song, I. (2002). Investigating the effects of store-brand introduction on retailer demand and pricing behavior. *Management Science*, *48*(10), 1242-1267.

Choi, S. C. (1991). Price competition in a channel structure with a common retailer. *Marketing science*, *10*(4), 271-296.

Chu, W., & Messinger, P. R. (1997). Information and channel profits. *Journal of Retailing*, *73*(4), 487-499.

Chunawalla, S. A. (2008). *Product Management*. Global Media. Retrieved from http://ebookcentral.proquest.com/lib/nigde/detail.action.

Cosguner, K., Chan, T. Y., & Seetharaman, P. B. (2017). Behavioral price discrimination in the presence of switching costs. *Marketing Science*, *36*(3), 426-435.

Cuellar, S. S., & Brunamonti, M. (2014). Retail channel price discrimination. *Journal of Retailing and Consumer Services*, *21*(3), 339-346.

Damanpour, F. (2010). An integration of research findings of effects of firm size and market competition on product and process innovations. *British Journal of Management*, 21(4), 996-1010.

David, F. R. (2011). *Strategic management concepts and cases*. Pearson.

Davies, G. (1994). The delisting of products by retail buyers. *Journal of Marketing Management*, *10*(6), 473-493.

Day, George S (2007), "Is it real? Can we win? Is it worth doing," *Harvard business review*, *85*(12), 110-120.

de Chematony, L. (2012). The impact of the changed balance of power from manufacturer to retailer in the UK packaged groceries market. In *Retail and Marketing Channels (RLE Retailing and Distribution)* (pp. 258-273). Routledge.

De Figueiredo, J. M., & Kyle, M. K. (2006). Surviving the gales of creative destruction: The determinants of product turnover. *Strategic Management Journal*, *27*(3), 241-264.

Desrochers, D. M., & Nelson, P. (2006). Adding consumer behavior insights to category management: Improving item placement decisions. *Journal of Retailing*, *82*(4), 357-365.

Desrochers, D. M., Gundlach, G. T., & Foer, A. A. (2003). Analysis of antitrust challenges to category captain arrangements. *Journal of Public Policy & Marketing*, *22*(2), 201-215.

Dhar, S. K., & Hoch, S. J. (1997). Why store brand penetration varies by retailer. *Marketing science*, *16*(3), 208-227.

Diamond Jr, A. M. (2006). Schumpeter's creative destruction: A review of the evidence. *Journal of Private Enterprise*, *22*(1), 120.

Dobson, P. W., Clarke, R., Davies, S., & Waterson, M. (2001). Buyer power and its impact on competition in the food retail distribution sector of the European Union. *Journal of Industry, Competition and Trade, 1*, 247-281.

Draganska, M., & Klapper, D. (2007). Retail environment and manufacturer competitive intensity. *Journal of Retailing*, *83*(2), 183-198.

Draganska, M., Klapper, D., & Villas-Boas, S. B. (2010). A larger slice or a larger pie? An empirical investigation of bargaining power in the distribution channel. *Marketing Science*, *29*(1), 57-74.

Dreze, X., Hoch, S. J., & Purk, M. E. (1994). Shelf management and space elasticity. *Journal of retailing*, *70*(4), 301-326.

Dubois, P., Albuquerque, P., Allais, O., Bonnet, C., Bertail, P., Combris, P., ... & Chandon, P. (2021). Effects of front-of-pack labels on the nutritional quality of supermarket food purchases: evidence from a large-scale randomized controlled trial. *Journal of the Academy of Marketing Science*, *49*(1), 119-138.

Dukes, A. J., Gal-Or, E., & Srinivasan, K. (2006). Channel bargaining with retailer asymmetry. *Journal of Marketing Research*, *43*(1), 84-97.

Dukes, A. J., Geylani, T., & Srinivasan, K. (2009). Strategic assortment reduction by a dominant retailer. *Marketing Science*, *28*(2), 309-319.

Dukes, A., Geylani, T., & Liu, Y. (2014). Dominant retailers' incentives for product quality in asymmetric distribution channels. *Marketing Letters*, *25*, 93-107.

Edmiston, J. (2023). *Fate of Canada's first grocery code of conduct in doubt with 2 big players on the fence*. (accessed Jan 21, 2024) https://financialpost.com/news/retail-marketing/canada-grocery-code-conduct-in-doubt-2-retailers-fence

Ellickson, P. B. (2007). Does Sutton apply to supermarkets?. *The RAND Journal of Economics*, *38*(1), 43-59.

Emrich, O., Paul, M., & Rudolph, T. (2015). Shopping benefits of multichannel assortment integration and the moderating role of retailer type. *Journal of Retailing*, *91*(2), 326-342.

Escaron, A. L., Meinen, A. M., Nitzke, S. A., & Martinez-Donate, A. P. (2013). Supermarket and grocery store–based interventions to promote healthful food choices and eating practices: a systematic review. *Preventing chronic disease*, *10*.

Fasolo, B., Carmeci, F. A., & Misuraca, R. (2009). The effect of choice complexity on perception of time spent choosing: When choice takes longer but feels shorter. *Psychology & Marketing*, *26*(3), 213-228.

Fenko, A., Kersten, L., & Bialkova, S. (2016). Overcoming consumer scepticism toward food labels: The role of multisensory experience. *Food quality and preference*, *48*, 81-92.

Fernhaber, S. A., & Patel, P. C. (2012). How do young firms manage product portfolio complexity? The role of absorptive capacity and ambidexterity. *Strategic management journal*, *33*(13), 1516-1539.

Ferrier, W. J. (2001). Navigating the competitive landscape: The drivers and consequences of competitive aggressiveness. *Academy of management journal*, *44*(4), 858-877.

Ferrier, W. Smith, K. G., & Grimm, C. M. (1999). The Role of Competitive Action in Market Share Erosion and Industry Dethronement: A Study of Industry Leaders and Challengers. *Academy of Management Journal*, *42*, 372-388.

Fisher, M., & Vaidyanathan, R. (2014). A demand estimation procedure for retail assortment optimization with results from implementations. *Management Science*, *60*(10), 2401-2415.

Fitzsimons, G. J. (2000). Consumer response to stockouts. *Journal of consumer research*, *27*(2), 249-266.

Foroughi, B., Nikbin, D., Hyun, S. S., & Iranmanesh, M. (2016). Impact of core product quality on sport fans' emotions and behavioral intentions. *International Journal of Sports Marketing and Sponsorship*, 17(2), 110-129.

Garretson, J. A., & Burton, S. (2000). Effects of nutrition facts panel values, nutrition claims, and health claims on consumer attitudes, perceptions of disease-related risks, and trust. *Journal of Public Policy & Marketing*, *19*(2), 213-227.

Gázquez-Abad, J. C., Martínez-López, F. J., & Sethuraman, R. (2021). What factors moderate the effect of assortment reduction on store switching? Insights and implications for grocery brands. *Journal of Business Research*, *133*, 98-115.

Geylani, T., Dukes, A. J., & Srinivasan, K. (2007). Strategic manufacturer response to a dominant retailer. *Marketing Science*, *26*(2), 164-178.

Giachetti, C., & Dagnino, G.B. (2021). Competitive dynamics in strategic management. In *Oxford Research Encyclopedia of Business and Management*. Oxford: Oxford University Press.

Glanz, K., & Yaroch, A. L. (2004). Strategies for increasing fruit and vegetable intake in grocery stores and communities: policy, pricing, and environmental change. *Preventive medicine*, *39*, 75-80.

Glanz, K., Bader, M. D., & Iyer, S. (2012). Retail grocery store marketing strategies and obesity: an integrative review. *American journal of preventive medicine*, *42*(5), 503-512.

Gölgeci, I., Malagueno, R., & Fearne, A. (2021). Unlocking the link between relationship duration and product De-listing in retail channels: The role of market orientation and brand diffusion. *Industrial Marketing Management*, *95*, 5-16.

Gopalakrishnan, S., Matta, M., Yourdshahy, M. I., & Choudhary, V. (2023). Go Wide or Go Deep? Assortment Strategy and Order Fulfillment in Online Retail. *Manufacturing & Service Operations Management*, *25*(3), 846-861.

Gov.UK. (2009). *Guidance Groceries Supply Code of Practice*. (accessed June 18, 2021) https://www.gov.uk/government/publications/groceries-supply-code-of-practice

Gruen, T. W., & Shah, R. H. (2000). Determinants and outcomes of plan objectivity and implementation in category management relationships. *Journal of retailing*, *76*(4), 483-510.

Gu, Y., & Wu, Y. (2023). Highlighting supply-abundance increases attraction to small-assortment retailers. *Journal of Retailing*, *99*(3), 420-439.

Gupta, V., Ivanov, D., & Choi, T. M. (2021). Competitive pricing of substitute products under supply disruption. *Omega*, *101*, 102279.

Hall, J. M., Kopalle, P. K., & Krishna, A. (2010). Retailer dynamic pricing and ordering decisions: category management versus brand-by-brand approaches. *Journal of Retailing*, *86*(2), 172-183.

Han, H., Yu, J., Chua, B.-L., Lee, S., & Kim, W. (2019). Impact of core-product and service-encounter quality, attitude, image, trust and love on repurchase: Full-service vs low-cost carriers in South Korea. *International Journal of Contemporary Hospitality Management*, 31(4), 1588-1608.

Hanson, N., & Yun, W. (2018). Should "big food" companies introduce healthier options? The effect of new product announcements on shareholder value. *Marketing Letters*, *29*, 1-12.

Harness, D. R., & Harness, T. (2012). Can product elimination support post-downsizing success aspirations?. *Journal of General Management*, *38*(2), 39-60.

Harness, T., & Harness, D. R. (2007). The stages of financial services product elimination. *Journal of Financial Services Marketing*, *12*, 197-207.

Hart, S. J. (1988). The causes of product deletion in British manufacturing companies. *Journal of Marketing Management*, *3*(3), 328-343.

Haynes, G. A. (2009). Testing the boundaries of the choice overload phenomenon: The effect of number of options and time pressure on decision difficulty and satisfaction. *Psychology & Marketing*, *26*(3), 204-212.

Hermans, M., Raassens, N., & Cleeren, K. (2024). What is the impact of a conflict delisting on firm value? An investigation of the role of conflict and firm characteristics. *Journal of the Academy of Marketing Science*, *52*(1), 240-259.

Hertenstein, Julie H., Marjorie B. Platt, and Robert W. Veryzer (2005), "The impact of industrial design effectiveness on corporate financial performance," *Journal of Product Innovation Management*, *22*(1), 3-21.

Hoang, D., & Breugelmans, E. (2023). "Sorry, the product you ordered is out of stock": Effects of substitution policy in online grocery retailing. *Journal of Retailing*, *99*(1), 26-45.

Hökelekli, G., Lamey, L., & Verboven, F. (2017). Private label line proliferation and private label tier pricing: a new dimension of competition between private labels and national brands. *Journal of Retailing and Consumer Services*, *36*, 39-52.

Homburg, C., Fürst, A., & Prigge, J. K. (2010). A customer perspective on product eliminations: how the removal of products affects customers and business relationships. *Journal of the Academy of Marketing Science*, *38*, 531-549.

Hwang, M., Bronnenberg, B. J., & Thomadsen, R. (2010). An empirical analysis of assortment similarities across US supermarkets. *Marketing Science*, *29*(5), 858-879.

Ikonen, I., Sotgiu, F., Aydinli, A., & Verlegh, P. W. (2020). Consumer effects of front-of-package nutrition labeling: An interdisciplinary meta-analysis. *Journal of the academy of marketing science*, *48*, 360-383.

Ippolito, P. M., & Mathios, A. D. (1991). Health claims in food marketing: Evidence on knowledge and behavior in the cereal market. *Journal of Public Policy & Marketing*, *10*(1), 15-32.

Islami, X., Mustafa, N., & Topuzovska Latkovikj, M. (2020). Linking Porter's generic strategies to firm performance. *Future Business Journal*, *6*, 1-15.

Iyengar, S. S., & Lepper, M. R. (2000). When choice is demotivating: Can one desire too much of a good thing?. *Journal of personality and social psychology*, *79*(6), 995.

Iyer, G., & Villas-Boas, J. M. (2003). A bargaining theory of distribution channels. *Journal of marketing research*, *40*(1), 80-100.

Jeuland, A., & Shugan, S. M. (2008). Managing channel profits. *Marketing Science*, *27*(1), 52-69.

Kadiyali, V., Chintagunta, P., & Vilcassim, N. (2000). Manufacturer-retailer channel interactions and implications for channel power: An empirical investigation of pricing in a local market. *Marketing Science*, *19*(2), 127-148.

Kang, Wooseong, and Mitzi Montoya (2014). The impact of product portfolio strategy on financial performance: The roles of product development and market entry decisions. *Journal of Product Innovation Management*, *31*(3), 516-534.

Katila, R., & Chen, E. L. (2008). Effects of search timing on innovation: The value of not being in sync with rivals. *Administrative science quarterly*, *53*(4), 593-625.

Kerin, R. A., Varadarajan, P. R., & Peterson, R. A. (1992). First-mover advantage: A synthesis, conceptual framework, and research propositions. *Journal of marketing*, *56*(4), 33-52.

Khanna, T. (1995). Racing behavior technological evolution in the high-end computer industry. *Research Policy*, *24*(6), 933-958.

Khessina, O. M., & Carroll, G. R. (2008). Product demography of de novo and de alio firms in the optical disk drive industry, 1983–1999. *Organization Science*, *19*(1), 25-38.

Kim, M., & Lennon, S. J. (2011). Consumer response to online apparel stockouts. *Psychology & Marketing*, *28*(2), 115-144.

King, S. (1970). What is a Brand. *J. Walter Thompson, London*.

Kirca, A. H., Randhawa, P., Talay, M. B., & Akdeniz, M. B. (2020). The interactive effects of product and brand portfolio strategies on brand performance: Longitudinal evidence from the US automotive industry. *International Journal of Research in Marketing*, *37*(2), 421-439.

Kirmani, A., Sood, S., & Bridges, S. (1999). The ownership effect in consumer responses to brand line stretches. *Journal of Marketing*, 63(1), 88-101.

Kök, A. G., Fisher, M. L., & Vaidyanathan, R. (2009). Assortment planning: Review of literature and industry practice. *Retail supply chain management: Quantitative models and empirical studies*, 99-153.

Kolay, S., & Shaffer, G. (2013). Contract design with a dominant retailer and a competitive fringe. *Management Science*, *59*(9), 2111-2116.

Kozup, J. C., Creyer, E. H., & Burton, S. (2003). Making healthful food choices: the influence of health claims and nutrition information on consumers' evaluations of packaged food products and restaurant menu items. *Journal of Marketing*, *67*(2), 19-34.

Krider, R. E., & Weinberg, C. B. (1998). Competitive dynamics and the introduction of new products: The motion picture timing game. *Journal of Marketing Research*, *35*(1), 1-15.

Ku, H. H., Kuo, C. C., & Huang, W. T. (2017). Message-related effects on consumer switching when the preferred product is out of stock. *European Journal of Marketing*, *51*(5/6), 1091-1109.

Kurtuluş, M., & Toktay, L. B. (2009). Category Captainship Practices in the Retail Industry. *Retail Supply Chain Management: Quantitative Models and Empirical Studies*, 79-98.

Kurtuluş, M., Ülkü, S., Dotson, J. P., & Nakkas, A. (2014). The impact of category captainship on the breadth and appeal of a retailer's assortment. *Journal of Retailing*, *90*(3), 379-392.

Lamberg, J. A., Tikkanen, H., Nokelainen, T., & Suur-Inkeroinen, H. (2009). Competitive dynamics, strategic consistency, and organizational survival. *Strategic Management Journal*, *30*(1), 45-60.

Lee, H., Smith, K. G., Grimm, C. M., & Schomburg, A. (2000). Timing, order and durability of new product advantages with imitation. *Strategic Management Journal*, *21*(1), 23-30.

Li HA, Wan X. (2023). Impact of conflict delisting and relisting on remaining products in retail stores: Sales gains across products categories and spillovers to nearby stores. *Production Oper. Management,* ePub ahead of print February 22.

Lieberman, M. B., & Montgomery, D. B. (1988). First-mover advantages. *Strategic management journal*, *9*(S1), 41-58.

Liu, Y., & Cui, T. H. (2010). The length of product line in distribution channels. *Marketing Science*, *29*(3), 474-482.

Liu, Y., & Zhang, Z. J. (2006). Research note—the benefits of personalized pricing in a channel. *Marketing Science*, *25*(1), 97-105.

Loblaw Companies Limited (2024). *Loblaw announces support for revised Grocery Code of Conduct* (accessed Jun 28, 2024) https://www.loblaw.ca/en/loblaw-announces-support-for-revised-grocery-code-of-conduct/

Ma, J. (2016). Does greater online assortment pay? An empirical study using matched online and catalog shoppers. *Journal of Retailing*, *92*(3), 373-382.

Maesen, S., Lamey, L., ter Braak, A., & Jansen, L. (2022). Going healthy: how product characteristics influence the sales impact of front-of-pack health symbols. *Journal of the Academy of Marketing Science*, *50*(1), 108-130.

Malhotra, N. K. (1984). Information and sensory overload. Information and sensory overload in psychology and marketing. *Psychology & Marketing*, *1*(3-4), 9-21.

Mantrala, M. K., Levy, M., Kahn, B. E., Fox, E. J., Gaidarev, P., Dankworth, B., & Shah, D. (2009). Why is assortment planning so difficult for retailers? A framework and research agenda. *Journal of Retailing*, *85*(1), 71-83.

Matsui, K. (2018). When and what wholesale and retail prices should be set in multi-channel supply chains?. *European Journal of Operational Research*, *267*(2), 540-554.

McKinsey & Company. (2021). *Feeling good: The future of the $1.5 trillion wellness market*. (accessed May 20th 2023) https://www.mckinsey.com/industries/consumer-packaged-goods/our-insights/feeling-good-the-future-of-the-1-5-trillion-wellness-market

Messinger, P. R., & Narasimhan, C. (1995). Has power shifted in the grocery channel?. *Marketing science*, *14*(2), 189-223.

Meza, S., & Sudhir, K. (2006). Pass-through timing. *Quantitative Marketing and Economics*, *4*, 351-382.

Meza, S., & Sudhir, K. (2010). Do private labels increase retailer bargaining power?. *Quantitative Marketing and Economics*, *8*(3), 333-363.

Mitchell, W. (1989). Whether and when? Probability and timing of incumbents' entry into emerging industrial subfields. *Administrative science quarterly*, 208-230.

Moorthy, S. (2005). A general theory of pass-through in channels with category management and retail competition. *Marketing Science*, *24*(1), 110-122.

More, Roger (2009), "How General Motors Lost its Focus—and its Way," *Ivey Business Journal, May-June*, (accessed May 8, 2023) https://iveybusinessjournal.com/publication/how-general-motors-lost-its-focus-and-its-way/

Morgan, L. O., Daniels, R. L., & Kouvelis, P. (2001). Marketing/manufacturing trade-offs in product line management. *Iie Transactions*, *33*(11), 949-962.

Mottner, S., & Smith, S. (2009). Wal-Mart: Supplier performance and market power. *Journal of Business Research*, *62*(5), 535-541.

Nash John F. (1950). The Bargaining Problem. *Econometrica*, *18*, 155–62.

Naylor, R. W., Droms, C. M., & Haws, K. L. (2009). Eating with a purpose: Consumer response to functional food health claims in conflicting versus complementary information environments. *Journal of Public Policy & Marketing*, *28*(2), 221-233.

Neslin, S. A., & Greenhalgh, L. (1983). Nash's theory of cooperative games as a predictor of the outcomes of buyer-seller negotiations: An experiment in media purchasing. *Journal of Marketing Research*, *20*(4), 368-379.

Newman, C. L., Howlett, E., & Burton, S. (2014). Shopper response to front-of-package nutrition labeling programs: Potential consumer and retail store benefits. *Journal of Retailing*, *90*(1), 13-26.

Newman, C. L., Howlett, E., & Burton, S. (2016). Effects of objective and evaluative front-of-package cues on food evaluation and choice: The moderating influence of comparative and noncomparative processing contexts. *Journal of Consumer Research*, *42*(5), 749-766.

Nikolova, H. D., & Inman, J. J. (2015). Healthy choice: the effect of simplified point-of-sale nutritional information on consumer food choice behavior. *Journal of Marketing Research*, *52*(6), 817-835.

O'Neill, N. (2023). *What is the grocery code of conduct, and will it help to lower the cost of food?*. (accessed Jan 21, 2024) https://www.ctvnews.ca/politics/what-is-the-grocery-code-of-conduct-and-will-it-help-to-lower-the-cost-of-food-1.6662266

Oppewal, H., & Koelemeijer, K. (2005). More choice is better: Effects of assortment size and composition on assortment evaluation. *International Journal of Research in Marketing*, *22*(1), 45-60.

Orquin, J. L., & Scholderer, J. (2015). Consumer judgments of explicit and implied health claims on foods: Misguided but not misled. *Food policy*, *51*, 144-157.

Pan, Y., & Zinkhan, G. M. (2006). Determinants of retail patronage: a meta-analytical perspective. *Journal of retailing*, *82*(3), 229-243.

Pasternack, B. A. (2008). Optimal pricing and return policies for perishable commodities. *Marketing science*, *27*(1), 133-140.

Pauwels, K., & Srinivasan, S. (2004). Who benefits from store brand entry?. *Marketing Science*, *23*(3), 364-390.

Pauwels, Koen, Jorge Silva-Risso, Shuba Srinivasan, and Dominique M. Hanssens (2004), "New products, sales promotions, and firm value: The case of the automobile industry," *Journal of marketing*, *68*(4), 142-156.

Piller, F. T., & Susumu, O. (2006). Reducing the risks of new product development. *MIT Sloan management review*, *47*(2), 65-71.

Progressive Grocer. 2004. Category Captains 2004: Captains of the Industry, *Progressive Grocer*, Nov. 15, 2004. *Project Dropstat. Contemporary Research in Marketing*, 989-1007.

Rajagopalan, S., & Xia, N. (2012). Product variety, pricing and differentiation in a supply chain. *European Journal of Operational Research*, *217*(1), 84-93.

Raju, J., & Zhang, Z. J. (2005). Channel coordination in the presence of a dominant retailer. *Marketing Science*, *24*(2), 254-262.

Ratchford, B., Soysal, G., Zentner, A., & Gauri, D. K. (2022). Online and offline retailing: What we know and directions for future research. *Journal of Retailing*, *98*(1), 152-177.

Reimann, M., Schilke, O., & Thomas, J. S. (2010). Toward an understanding of industry commoditization: Its nature and role in evolving marketing competition. *International Journal of Research in Marketing*, *27*(2), 188-197.

Reutskaja, E., & Hogarth, R. M. (2009). Satisfaction in choice as a function of the number of alternatives: When "goods satiate". *Psychology & Marketing*, *26*(3), 197-203.

Rubera, G., & Kirca, A. H. (2012). Firm innovativeness and its performance outcomes: A meta-analytic review and theoretical integration. *Journal of Marketing*, *76*(3), 130-147.

Scheibehenne, B., Greifeneder, R., & Todd, P. M. (2010). Can there ever be too many options? A meta-analytic review of choice overload. *Journal of consumer research*, *37*(3), 409-425.

Schoenbachler, D. D., & Gordon, G. L. (2002). Multi-channel shopping: understanding what drives channel choice. *Journal of consumer marketing*, *19*(1), 42-53.

Segal-Horn, S., & McGee, J. (2012). Strategies to cope with retailer buying power. In *Retail and Marketing Channels (RLE Retailing and Distribution)* (pp. 24-48). Routledge.

Sethuraman, R., Gázquez-Abad, J. C., & Martínez-López, F. J. (2022). The effect of retail assortment size on perceptions, choice, and sales: Review and research directions. *Journal of Retailing*, *98*(1), 24-45.

Shah, A. M., and George W. (2007). Buying behavior as a function of parametric variation of number of choices. *Psychological Science*, *18*(5), 369-370.

Shankar, V., Carpenter, G. S., & Farley, J. (Eds.). (2012). *Handbook of marketing strategy*. Edward Elgar Publishing.

Simonson, I. (1999). The effect of product assortment on buyer preferences. *Journal of retailing*, *75*(3), 347-370.

Sinha, A., Sahgal, A., & Mathur, S. K. (2013). Practice prize paper—category optimizer: A dynamic-assortment, new-product-introduction, mix-optimization, and demand-planning system. *Marketing Science*, *32*(2), 221-228.

Sloot, L. M., & Verhoef, P. C. (2008). The impact of brand delisting on store switching and brand switching intentions. *Journal of Retailing*, *84*(3), 281-296.

Sloot, L. M., Fok, D., & Verhoef, P. C. (2006). The short-and long-term impact of an assortment reduction on category sales. *Journal of Marketing Research*, *43*(4), 536-548.

Smith, K. G., Ferrier, W. J., & Ndofor, H. (2005). Competitive dynamics research: Critique and future directions. *The Blackwell handbook of strategic management*, 309-354.

Soberman, D. A., & Parker, P. M. (2006). The economics of quality-equivalent store brands. *International Journal of Research in Marketing*, *23*(2), 125-139.

Stavins, J. (1995). Model entry and exit in a differentiated-product industry: The personal computer market. *The Review of Economics and Statistics*, 571-584.

Sudhir, K. (2001). Structural analysis of manufacturer pricing in the presence of a strategic retailer. *Marketing Science*, *20*(3), 244-264.

Tahirov, N., & Glock, C. H. (2022). Manufacturer encroachment and channel conflicts: A systematic review of the literature. *European Journal of Operational Research*, *302*(2), 403-426.

Terzi, S., Bouras, A., Dutta, D., Garetti, M., & Kiritsis, D. (2010). Product lifecycle management–from its history to its new role. *International Journal of Product Lifecycle Management*, 4(4), 360-389.

Thompson, Debora Viana, Rebecca W. Hamilton, and Roland T. Rust (2005), "Feature fatigue: When product capabilities become too much of a good thing," *Journal of marketing research*, *42*(4), 431-442.

Toffel, M. W. (2003). The growing strategic importance of end-of-life product management. *California Management Review*, *45*(3), 102-129.

Trader Joe's. (2023). *Discontinued Product Feedback*. (accessed April 30, 2023) https://www.traderjoes.com/home/contact-us/discontinued-products

Van der Maelen, S., Breugelmans, E., & Cleeren, K. (2017). The clash of the titans: on retailer and manufacturer vulnerability in conflict delistings. *Journal of Marketing*, *81*(1), 118-135.

Van Trijp, H. C., & Van der Lans, I. A. (2007). Consumer perceptions of nutrition and health claims. *Appetite*, *48*(3), 305-324.

Varadarajan, R., Yadav, M. S., & Shankar, V. (2008). First-mover advantage in an Internet-enabled market environment: conceptual framework and propositions. *Journal of the Academy of Marketing Science*, *36*, 293-308.

Verbeke, W., Scholderer, J., & Lähteenmäki, L. (2009). Consumer appeal of nutrition and health claims in three existing product concepts. *Appetite, 52*(3), 684-692.

Verhoef, P. C., & Sloot, L. M. (2009). Out-of-stock: reactions, antecedents, management solutions, and a future perspective. In *Retailing in the 21st century: Current and future trends* (pp. 285-299). Berlin, Heidelberg: Springer Berlin Heidelberg.

Villas-Boas, J. M. (1998). Product line design for a distribution channel. *Marketing science*, *17*(2), 156-169.

Villas-Boas, J. M., & Zhao, Y. (2005). Retailer, manufacturers, and individual consumers: Modeling the supply side in the ketchup marketplace. *Journal of Marketing Research*, *42*(1), 83-95.

Villas-Boas, J. M. (2006). Dynamic competition with experience goods. *Journal of Economics & Management Strategy*, *15*(1), 37-66.

Volberda, H. W., Morgan, R. E., Reinmoeller, P., Hitt, M. A., Ireland, R. D., & Hoskisson, R. E. (2011). *Strategic management: Competitiveness and globalization (concepts and cases)*. Cengage Learning.

Wan, Xiang, Philip T. Evers, and Martin E. Dresner (2012), "Too much of a good thing: The impact of product variety on operations and sales performance," *Journal of Operations Management, 30*(4), 316-324.

Wansink, B. (2017). Healthy profits: An interdisciplinary retail framework that increases the sales of healthy foods. *Journal of Retailing*, *93*(1), 65-78.

Weckles, R. (1971). Product line deletion and simplification: Tough but necessary decisions. *Business Horizons*, *14*(5), 71-74.

Wei, S., Tang, O., & Sundin, E. (2015). Core (product) Acquisition Management for remanufacturing: a review. *Journal of Remanufacturing*, *5*, 1-27.

Xiao, T., Choi, T. M., & Cheng, T. C. E. (2014). Product variety and channel structure strategy for a retailer-Stackelberg supply chain. *European Journal of Operational Research*, *233*(1), 114-124.

Yao, D. Q., & Liu, J. J. (2005). Competitive pricing of mixed retail and e-tail distribution channels. *Omega*, *33*(3), 235-247.

Young, G., Smith, K. G., & Grimm, C. M. (1996). "Austrian" and industrial organization perspectives on firm-level competitive activity and performance. *Organization science*, *7*(3), 243-254.

Zhang, J., & Krishna, A. (2007). Brand-level effects of stockkeeping unit reductions. *Journal of Marketing Research*, *44*(4), 545-559.

Zhu, Q., Martins, R. A., Shah, P., & Sarkis, J. (2021). A bibliometric review of brand and product deletion research: Setting a research agenda. *IEEE Transactions on Engineering Management*, *70*(2), 554-575.

Zott, C., & Amit, R. (2008). The fit between product market strategy and business model: Implications for firm performance. *Strategic management journal*, 29(1), 1-26.