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Unlimited shelf space in Internet supply chains: Treasure trove or wasteland?

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ABSTRACT

Internet retailing offers merchants limitless shelf space. This has led experts to highlight the existence of a "long tail" of offerings on the web and assert that the future of online business is "selling less of more." However, it is difficult for Internet retailers of physical goods to sell a large scope of products without having to handle potentially large amounts of product returns from customers. This is due to the fact that customers can and do get overwhelmed by excessive product variety and often make erroneous purchasing decisions. We shed light on this issue through an assessment of theoretical predictions based on data from sales and returns of almost 7000 products in a particular product category. While retailers can benefit from expanding the scope of their inventories to generate Internet sales, the success of this strategy will depend on the control of unjustified product returns by consumers and the management of recurrent execution errors and product fit failures in transactions with customers. Furthermore, from our results, the gains that this strategy will bring to retailers will be bound by the amount of time products have been available on the Internet retailer's site, as well as by other attributes such as product price and size.

1. Introduction

In the retail industry, merchandise assortments can increase inventory carrying costs and expenditures caused by product returns. To control these costs, many retailers have maintained relatively few stock-keeping units (SKUs), yielding a pattern of concentration in sales commonly known as the 80/20 rule and described by the Pareto Principle. This pattern of concentration has led authors to underscore the drawbacks of inactive SKU assortments in the supply chain (Fisher et al., 2000). Accordingly, many studies have highlighted the importance of balancing additional sales from a wider range of SKUs with their associated costs (Van Ryzin and Mahajan, 1999; Smith and Agrawal, 2000; Chong et al., 2001).

Some have claimed that the surge of Internet retail activity can dilute this concentrated pattern of sales by lowering consumer search costs (Brynjolfsson et al., 2003). As a result, they have argued that Internet commerce may contribute to an expansion in the share of sales by niche products, thereby creating a longer tail in the distribution of SKU sales (Brynjolfsson et al., 2007). This phenomenon may ultimately make it more attractive to sell a greater variety of SKUs without incurring excessive carrying and product return costs (Cachon et al., 2005).

While the Internet may improve customers' ability to search for and find products best suited for their needs, research has yet to document a discernible market preference for product variety, as reflected in the distribution of actual sales across many different SKUs offered to consumers. It is unclear, in particular, whether such a preference would be hindered by limitations faced by consumers when purchasing certain products remotely or by Internet retailer failures in executing the operations necessary to complete those purchases.

Difficulties such as these will inevitably translate into greater product returns, which, in the end, will hamper the shift towards greater product variety in Internet sales—especially if those sales depend on the availability of products in inventory exclusively owned and stocked by an Internet retailer. The Internet retailing industry includes many merchants that sell most of their products from stock they themselves own and carry at a facility. For these retailers, returns – which typically range from nearly 1% to well over 20% of sales depending on category (Brohan, 2005) – can create product obsolescence risks and transportation and warehousing costs in excess of $20 per return, according to Gartner Research. To limit these returns, Internet retailing managers may reduce the scope of products they offer by eliminating items that are frequently returned (Baird, 2008). However, they may also consider whether these returns occur independently of these products and, instead, are caused by customers' difficulties in effectively searching, evaluating, and purchasing these products on the Internet (Gardner, 2008).

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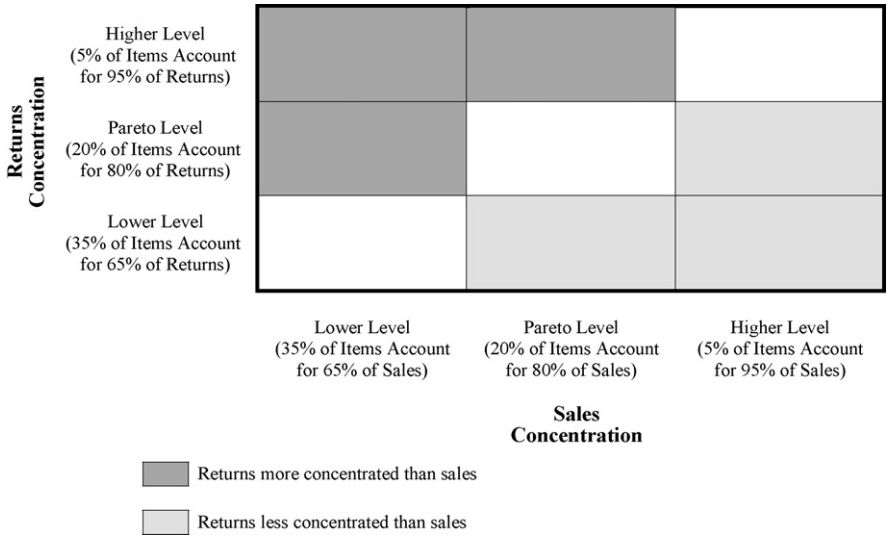

Fig. 1. Examples of sales and return concentrations.

A study of market preferences that examines the distribution of sales across SKUs in juxtaposition with the distribution of product returns across the same SKUs will help Internet retailers define a more appropriate breadth of product assortment. Therefore, we seek to evaluate customer preferences for product variety when purchasing from an Internet retailer in relation to customer tendencies to rely on product returns after they have received their purchases. If, as illustrated by the examples in Fig. 1, returns prove to be less concentrated than sales (e.g., 35% of items account for 65% of returns while 20% of items account for 80% of sales), it suggests that a broad offering exposes the Internet retailer to costly risk because returns are distributed across a relatively wider product assortment. In contrast, a more concentrated returns pattern (e.g., 5% of items account for 95% of returns) highlights a more manageable risk relative to the product breadth. Either way, further insight into systemic drivers of customer returns would help an Internet retailer grapple with the question of which specific products should be included in the assortment. Simply put, customers would ideally like an assortment that provides sufficient choice but does not impose needless effort to identify the optimal selection during the shopping process. Should the process prove overwhelming or if the product cannot be adequately assessed in an online forum, the customer may simply buy the product with an expectation of returning it if it proves insufficient upon physical inspection. Prior research (Mollenkopf et al., 2007) highlighted the incidence of "Devil Customers" and anecdotal evidence from Zappos.com, the leading shoe retailer, underscores how some customers purposely buy multiple sizes and/or colors of the same product with an expectation of keeping only the one which fits or matches best while returning the others. However, to our knowledge, the broader issue of the optimal product breadth in light of these behaviors has not been examined theoretically or empirically.

To investigate this issue rigorously, we consider a formulation comprising *all-inclusive* transactions between online retailers and customers (Kohn and Shavell, 1974). These transactions involve customer purchases (generating forward material flows) as well as purchases that are returned (triggering reverse material flows). Under this formulation, customers expressly state their preferences for different SKUs by purchasing them once they have had a chance to evaluate, compare, and find those items that appear to meet their needs (Bailey, 1998). However, customers will also have the chance to ratify or reverse their decisions by choosing whether to return those products that prove inadequate (Wood, 2001).

Moreover, we examine how different product characteristics and product return reasons by customers shape the purchases and the returns of different SKUs through an evaluation of the distribution of sales across SKUs and in juxtaposition with the distribution of product returns across the same SKUs. While researchers have examined how product characteristics affect consumers' ability to find goods for purchase on the Internet (Heim and Sinha, 2001) and have explored customers' motivations for returning products in the Internet retailing context (Boyer and Hult, 2006), the effect of these factors on product sales and returns is far from obvious and has received little research attention.

To address our research objectives, Section 2 first reviews the relevant literature and develops several hypotheses that are empirically assessed in Sections 3 and 4. We then present a discussion of these results and our conclusions in Section 5.

2. Theoretical framework

The study of customer preferences for different products is rooted in the work on stability in competition based upon products' physical locations (Hotelling, 1929). Because the advent of the Internet has made product locations a less dominant operating factor in differentiation (Boyer et al., 2002), research in operations management has shifted the focus to the role of services and prices in the study of competitive advantages and customer preferences in electronic commerce.

The work on services in Internet retailing has mainly considered measures of customers' stated preferences about implicit elements of quality embedded in retailing sites. Through this work, authors have conceptualized and empirically assessed linkages between the quality of service elements, such as order processing, picking, and delivery, and perceptions of performance, satisfaction, and loyalty among customers (Heim and Sinha, 2001; Thirumalai and Sinha, 2005; Boyer and Hult, 2006). Moreover, work in this stream of literature has captured subjective evidence regarding the role that the quality of services plays in generating competitive advantages and profits for Internet retailers. Service elements such as order fulfillment and the interactivity, design, and functionality of Internet sites have been part of this research (Hallowell, 2001; Boyer et al., 2002; Piccoli et al., 2004; Olson et al., 2005).

Research on pricing in electronic commerce has added to this stream of literature by considering the connections that exist between policies on retail pricing and Internet services within