International Journal of Production Economics 197 (2018) 84–98

Contents lists available at ScienceDirect

International Journal of Production Economics

journal homepage: www.elsevier.com/locate/ijpe

Money-back guarantee and personalized pricing in a Stackelberg manufacturer's dual-channel supply chain

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ARTICLE INFO

Keywords:
Dual-channel
Manufacturer Stackelberg game
Customer returns
Pricing
Product line

ABSTRACT

We examine customer returns and pricing strategies in a manufacturer's Stackelberg supply chain using game-theoretic models. In the supply chain, the manufacturer sells a high-quality product through an independent retailer, and considers whether or not to open a direct channel to sell a similar but lower-quality product. We discuss how the retailer and the manufacturer with a direct channel should choose their customer returns and pricing strategies. We show that when the retailer implements a personalized pricing strategy (PPS), the addition of the direct channel benefits the manufacturer but always makes the retailer worse off, and this differs from the case when the retailer adopts a uniform pricing strategy. We find that if its net salvage value of the product is positive, the retailer should offer a Money-Back Guarantee (MBG) and implement PPS. In the direct channel, however, the manufacturer may offer an MBG even if the net salvage value is negative, and may implement PPS only if customer satisfaction in the direct channel is low. Under certain conditions, a win-win may result from both the retailer's adoption of MBG and PPS and the manufacturer's adoption of MBG in its direct channel, while the adoption of PPS by the manufacturer in its direct channel may lead to lose-lose for the retailer and the manufacturer. The implications of customer returns and pricing strategies, as well as the impact of these two strategies on prices, demands, and profits, are discussed.

1. Introduction

A manufacturer sells a product directly to customers, in order to compete in the market with its retailers. The rapid growth of the Internet in recent decades has made it much easier for manufacturers to add this type of direct online channel. A study conducted by Forrester Research shows that brand manufacturers' direct sales grew almost 30% in 2013 and are expected to reach 34% of total sales by 2016 (Xia et al., 2016). While adding a direct channel allows manufacturers to enjoy increased revenues, it may threaten existing channel relationships with retailers (Tsay and Agrawal, 2004; Cattani et al., 2006; Cai, 2010). In a Shopatron survey, 64% of retailers said that they would reduce or stop buying products from some brands if those brands began selling directly to customers (Rueter, 2011).

To mitigate channel conflict, many manufacturers design different product lines at different quality levels for different distribution channels (Shi et al., 2013; Ha et al., 2015). For example, manufacturers may sell high-quality products through retailers and low-quality products through direct channels. In practice, clothing companies such as Coach, Gap, J. Crew, LL Bean, and Nike, have all opted to sell their relatively lower-quality products through their factory outlet stores, reserving their higher-quality products for distribution through retail stores (Maheshwari, 2014). Likewise, an increasing number of personal computer manufacturers, such as Hewlett-Packard, Dell, and Toshiba, have developed exclusive products characterized by higher quality to sell through certain retail partners like Wal-Mart and CompUSA (Lawton, 2007). For more examples on vertical product differentiation across manufacturers' two channels, see Shi et al. (2013) and Ha et al. (2015). Recent studies also suggest that the manufacturer has an incentive to offer higher product quality in an indirect channel than in a direct channel (Xu, 2009; Shi et al., 2013; Chung and Lee, 2014; Jerath et al., 2015). As pointed out by Liu (2012), although customers may revel in the convenience of

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https://doi.org/10.1016/j.ijpe.2017.12.027
Received 21 May 2017; Received in revised form 18 December 2017; Accepted 26 December 2017
Available online 2 January 2018

shopping in the direct/online channel, the low prices are often accompanied by even lower product quality, and the trend of declining product quality in the direct/online channel may increase in significance in the future.

Customer service and pricing are among the most important marketing strategies for sellers to stay competitive in the market (Chen and Chen, 2017a). With product returns being common, sellers are beginning to focus on creating a good return experience as one way to compete in customer service, and offering lenient returns policies, such as money-back guarantees (MBGs), is increasingly popular. From surveys, McWilliams and Gerstner (2006) found that 87% of stores in 47 large specialty retailers in the US have implemented an MBG and McWilliams (2012) found that all of the top 10 online clothing retailers from the Top 500 List on the Internet Retailer website, and 16 brick and-mortar retailers with high direct sales, offer MBGs. From the customer's perspective, the MBG is highly desirable because it allows for returning unsatisfactory products with a full refund (Akçay et al., 2013; Heydari et al., 2017). In addition, MBGs can reduce perceptions of risk and stimulate emotional responses, and thus may enhance customers' purchase intentions and ultimately willingness to pay (Suwelack et al., 2011). Statistics from eConsultancy show that 81% of customers want simple, easy, and free returns, and 92% of customers will purchase something again if they are satisfied with the returns strategy; moreover, 62% of customers are more likely to make a direct or online purchase if they can return an item (Rudolph, 2016).

Although an MBG increases customer satisfaction and stimulates sales, it may also result in a high volume of returned products and associated high handling costs. The returns rates in traditional retail channels average 8% (National Retail Federation, 2015), but they are higher for online sales, typically between 20% and 40% (Ratcliff, 2014). For fashion products sold through mail order or over the internet, the returns rate can even be as high as 75% (Mostard and Teunter, 2006).

Frequent returns entail significant costs to sellers. It is estimated that US manufacturers and retailers spend more than $100 billion each year on returns-related logistics, an average revenue drain of nearly 4 percent per year (Petersen and Kumar, 2015). Wightman-Stone (2015) reports that sellers worldwide are losing around 425.6 billion pounds per year simply through customer returns. In practice, some sellers have chosen to tighten their liberal returns strategies (Su, 2009), or even implemented a no-refund strategy (Hsiao and Chen, 2015), to limit the amount of returns and the associated costs. There is obvious value for sellers in developing strategies to balance the benefits and costs of customer returns.

While uniform pricing remains ubiquitous, sellers today have the unprecedented flexibility to implement personalized pricing as they build up the capability to identify individual customers (Liu and Zhang, 2006). Different customers typically derive different value from the same product. Sellers respond to this heterogeneity in valuation by trying to determine what customers will pay (Choudhary et al., 2005). Rapid advances in information technology and customer analytics allow sellers to collect and process detailed customer data (Shaffer and Zhang, 1995, 2002), including customer profiles, and web browsing and purchasing history, and gauge individual customer's preferences and willingness to pay for a product with considerable accuracy and cost effectiveness (Aydin and Ziya, 2009; Obermiller et al., 2012). This facilitates the implementation of a personalized pricing strategy (PPS), in which a seller can set the price for an individual customer based on knowledge of that customer's willingness to pay (Choudhary et al., 2005; Chen and Chen, 2017b). Price discrimination through implementation of PPS has come to retail stores in the form of the loyalty card system (Aydin and Ziya, 2009).

PPS can be achieved in practice in various forms, such as coupons, or special rebate codes for member-customers or account holders (Chen and Chen, 2017a). In the fashion industry, some online and retail stores have long offered personalized promotions, VIP discounts, or exclusive sales to different segments of the customer base, to compete more effectively in the marketplace (Abnett, 2015). The New York Times reports that supermarket chains, such as Kroger and Safeway, track the purchases of customers who participate in store loyalty programs, and are implementing PPS via smartphone apps (Tuttle, 2012). PPS will meet customer needs if the customer information collected by the seller is accurate (Clifford, 2012). For a seller, this kind of targeted pricing can increase sales, but it also increases the difficulty of competing on price, since deals are not necessarily offered publicly (Obermiller et al., 2012; Elliott, 2015).

In this paper, motivated by the retailer and the manufacturer with direct channel who face customer returns and pricing issues, we study the commonly-adopted MBG and newly-emerged PPS together, in a Stackelberg manufacturer's dual-channel supply chain. Specifically, we examine:

(1) Should the manufacturer open a direct channel to sell a low-quality product when it also sells a high-quality product in the retail channel? Will the manufacturer's direct channel benefit the retailer?
(2) How should the retailer and the manufacturer's direct channel choose customer returns and pricing strategies? What are the interactions between MBG and PPS?
(3) How do MBG and PPS affect the prices, demands, and profits of the retailer and the manufacturer in a single indirect channel vs. a dual-channel?

To address these questions, we consider a supply chain in which a Stackelberg manufacturer sells a high-quality product through an independent retailer, and considers whether or not to open a direct channel to sell a similar but lower-quality product. We assume that the distribution of customer valuation is known to the retailer and the manufacturer (as in Choudhary et al., 2005), and high (low) quality reflects a high (low) customer satisfaction rate (as in, for example, Moorthy and Srinivasan, 1995; McWilliams, 2012). We thus assume that customer satisfaction rate in the indirect channel is higher than that in the direct channel. We develop game-theoretic models to discuss how the retailer and the manufacturer (in its direct channel) should decide the customer returns strategy (either no MBG or MBG) and pricing strategy (either uniform pricing or PPS), as well as how the two strategies affect the competition between the two channels.

We show that customer returns and pricing strategies can be determined independently at the retailer, but the manufacturer's pricing strategy in its direct channel significantly affects its decision on returns strategy. Specifically, we find that both MBG (as long as the net salvage value is positive) and PPS are dominant strategies for the retailer and lead to a win-win for the retailer and the manufacturer. We also find that when the manufacturer implements uniform pricing in the direct channel it should also offer an MBG, if the net salvage value is positive; interestingly, when the direct channel implements PPS, even if the net salvage value is negative, the manufacturer may offer an MBG in the direct channel, but it relies more on the retailer to sell the product. In this situation, the direct channel's MBG can create a win-win for the manufacturer and the retailer. PPS in the direct channel always reduces the retailer's profit, and does not always enhance the manufacturer's profit, due to competition from the indirect channel. We identify the conditions under which PPS dominates a uniform pricing strategy in the direct channel. In addition, we show that when the retailer implements PPS, the introduction of the direct channel benefits the manufacturer, but is always detrimental to the retailer. This result differs from the case in which the retailer can only adopt uniform pricing; the addition of a direct channel may enhance the profits of both the manufacturer and the retailer.

Although there is a vast literature on the dual-channel structure, customer returns, and personalized pricing, to the best of our knowledge, this is the first study that explores the strategic interactions among MBG, PPS, and dual channel with vertical product differentiation in a supply chain setting. Our paper contributes to the literature in three areas: First,