



Production, Manufacturing and Logistics

## Consumer returns policies with endogenous deadline and supply chain coordination

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## ARTICLE INFO

## Article history:

Received 27 December 2013

Accepted 25 September 2014

Available online 30 October 2014

## Keywords:

Supply chain management

Consumer behavior

Product returns

Return deadline

Buy-back contract

## ABSTRACT

This paper considers returns policies under which consumers' valuation depends on the refund amount they receive and the length of time they must wait after the item is returned. Consumers face an uncertain valuation before purchase, and the realization of that purchase's value occurs only after the return deadline has passed. Depending on the product lifecycle length and magnitude of return rate, a retailer decides on strategies for that product's return deadline, including return prohibition, life-cycle return, and fixed return deadline. In addition, the influence of the return deadline on consumers' behavior and the pricing and inventory policies of the retailer are systematically investigated. Moreover, based on the analysis of consumer return behavior on a traditional buy-back contract, we present a new differentiated buy-back contract, contingent on return deadline, to coordinate a supply chain consisting of an upstream manufacturer and a downstream retailer. Finally, extensions on some specific behavioral factors such as moral hazard, inertia return, and external effect are investigated.

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### 1. Introduction

In today's society, consumer returns are increasing drastically because consumers are taking advantage of the retail industry's slogan that the "consumer is king." Today's consumers have more requirements for product attributes and they are more vigilant about return policies (Shulman, Coughlan, & Savaskan, 2010, 2011). Because of the increasing number of products released in the market, consumer uncertainty has also increased; the volume of available retail goods dictates whether a particular product is deemed suitable for individual consumer preferences. Hence, the main reason for consumer returns is no longer product quality issues. Instead, a number of other reasons generate product returns, including installation difficulties, product performance incompatibility with consumer preferences, and buyer remorse (Kumar, Guide, & Van Wassenhove, 2002). If an unconditional 100 percent money-back guarantee is offered, a retailer should expect frequent product returns. Ferguson, Guide, and Souza (2006) first observed False Failure Returns (FFR), defined as products with no functional or cosmetic defect that are nonetheless returned by consumers. Mainly, FFR results from consumer uncertainty over the valuation of a product before purchase, and other uncertainties such

as a product not satisfying consumer expectations, the consumer's difficulty in understanding how to use a product, or the consumer's regret over an impulse purchase (Su, 2009; Shulman et al., 2011). Based on a study conducted by Shear, Speh, and Stock (2002), US consumer returns amount to more than \$100 billion each year, of which FFRs account for 80 percent (Lawton, 2008). Recently, many firms have enacted standard practices to consider FFR; retailers want to improve their service level and to eliminate consumer losses from uncertain estimations over sold products. For example, vendors like Toys "R" Us, Wal-Mart, and Amazon encourage FFR or unconditional returns, and these return services are offered to the consumers with return deadlines of either 15, 45, or 90 days<sup>1</sup> for different products from various vendors.

Although encouraging FFR improves consumer satisfaction, it increases the risks for retailers at the same time. In addition, it also generates huge volume returns, which adversely affects the retailer's inventory and ordering strategies. Furthermore, it directly influences the production schedule of upstream manufacturers. Meanwhile, a large quantity of returns leads to a reduction in the marginal profit of the retailer given that returns are usually resold at discounts. Under such circumstances, consumers have no risk. Even though FFR is

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practiced by many vendors, most of the vendors have started tightening their generous return policies (Earnest & Uribarri, 2007; Li, Xu, & Li, 2013). Generally, when a consumer returns a product, the retailer may charge a restocking or handling fee, or they may ask the consumer to pay the shipping fee for returns. This unconditional return policy is currently adopted by Walmart.com and Taobao.com etc.<sup>2</sup> In addition to the above fee, the retailer may also set up a fixed return deadline and accept only products returned within that specified period. These fees and fixed return deadline requirements are similar to “hassle” costs and punishments imposed on consumers (Shulman, Coughlan, & Savaskan, 2009). When consumers view the shipping fee of the returned product as relatively expensive, or find the product economically nonviable for return by the fixed deadline, they may instead decide to hold on to it. In this way, pricing strategy, refund policy, and return deadline strategy temper consumer decision-making regarding impetuous purchases by introducing potential misgivings about the expenses they may incur, with an end result of reducing the occurrence of FFR (Shulman et al., 2009).

Due to the wide range of product categories offered in the market, various retailers calculate return expenses differently. For electronic items, for example, the Apple store charges 10 percent of the selling price as restocking fee, whereas Bestbuy.com charges 25 percent on household appliances. The return expense of some pasta products is pegged at 15 percent. For products with different lifecycles, retailers in other industries set return deadlines of varying lengths. For example, at Sears, the return deadline is 120 days for most of the items, 90 days for fine jewelry, and 60 days for electronics and beds,<sup>3</sup> whereas at Wal-Mart, 90 days for most items, 45 days for PC accessories, 30 days for cameras, and 15 days for PCs and cell phones. In general, a short return deadline is generally applied to seasonal products with a short lifecycle; the best example would include fashion items. Conversely, a relatively long return deadline is applied to more durable goods.

Based on the above-mentioned practices, in this paper we focus on retailer pricing and refund policies. Moreover, we study the return deadline and inventory policy of the retailer for products with different lifecycles. In addition, this work concentrates on the management of returned and unsold products. In practice, when the retailers receive the returned product, they redirect the product to their forward suppliers through some cooperation mechanisms, such as a kind of supply contract. It is evident from the literature that there exists many types of contracts to achieve supply chain coordination, but none addresses the issues related to the return deadline constraints. In consideration of this issue, we investigate the efficiency of several buy-back contracts related to decentralized supply chain coordination within return deadline constraints.

The rest of the paper is organized as follows. We briefly discuss the current literature and the contributions of this paper in Section 2. Section 3 presents the research problem on consumer purchasing, return behavior, and retailer pricing policies. In Section 4, we formulate the basic model and derive the optimal refund policy, return deadline, and inventory policy. In Section 5, we examine the effect of several buy-back contracts on supply chain coordination. We explore some extensions in Section 6 including behavioral factors like moral hazard, inertia return behavior, and external effect. The concluding remarks and possible directions for future research are provided at the end of the paper. To simplify our exposition: (i) we use “he” and “she” to represent the retailer and consumer, respectively throughout this paper, and (ii) all proofs are provided in Appendix A.

<sup>2</sup> For the return policy adopted by Amazon.com, refer to “Returns Are Easy” term [http://www.amazon.com/gp/css/returns/homepage.html/ref=hy\\_f\\_4](http://www.amazon.com/gp/css/returns/homepage.html/ref=hy_f_4). For Taobao.com’s return policy, refer to <http://www.tmall.com/?spm=1.6659421.754904973.1.RKFLOD>.

<sup>3</sup> For more details, refer to <http://www.sears.com>.

## 2. Literature review

In the following, we provide a brief discussion of related literature under four important dimensions, such as: (1) consumer purchasing behavior; (2) consumer return behavior; (3) product return policies; and (4) buy-back contracts within supply chains.

### 2.1. Consumer purchasing behavior

The main focus of this paper is devoted to researching consumer behavior in relation to operations management. We highlight the relationship among consumer demand, product inventory, and pricing policy. For example, when one consumer considers making a purchase depending on her expectations of what will be the future price, this forward-looking behavior has been widely addressed in consumer behavior literature (e.g., Aviv & Pazgal, 2008; Elmaghraby, Gülcü, & Keskinocak, 2008; Su, 2007), where consumer purchasing decisions often depend on future prices, especially when those products are on sale. At the same time, this strategic consumer behavior involves constant anticipation of markdowns, offered when there is excess inventory (Cachon & Swinney, 2009; Liu & Ryzin, 2008; Su & Zhang, 2007). In contrast to the above, the risk of stock-outs discourages consumer patronage (Dana & Petrucci, 2001; Su & Zhang, 2009).

The next more relevant literature on consumer behavior is about consumer purchasing decisions in relation to pricing history. Based on the reference effect theory, consumer purchasing decisions are taken by previously observed prices or through observations of prices of similar products relative to the reference price (for example, Kopalle, Rao, & Assunção, 1996; Nasiry & Popescu, 2011; Popescu & Wu, 2007). In all cases, consumer demand is endogenously determined and dependent on the pricing and inventory decisions of the retailer. A paper similar to ours is that of Su (2009), who considers consumers being uncertain about valuation. However, the author focuses only on fit risk, pertaining to whether a particular item matches consumer needs or tastes. In our work, the valuation model proposed by Su (2009) is extended to a more realistic case, where consumer valuation is stochastically dependent on the retailers’ return deadline. Generally, the return deadline has a huge impact on consumers’ valuation (Davis, Hagerty, & Gerstner, 1998), and specifically, the more generous a return deadline, the more value consumers expect (Kirmani & Rao, 2000; Mukhopadhyay & Setaputra, 2004).

### 2.2. Consumer return behavior

The next important dimension of this paper is about consumer return behavior. Most of the earlier research assumed that consumer returns follow Poisson processes, and a relevant inventory control model is studied under such settings (Cohen, Pierskalla, & Nahmias, 1980; Fleischmann, Kuik, & Dekker, 2002; Kelle & Silver, 1989). But recently the interest has shifted to consumer returns that depend on the decision variables of the retailer, such as pricing, refunds, and product quality. Mukhopadhyay and Setaputra (2004) analyzed the impact of pricing and return policies on consumer purchasing and return decisions under a direct-sale model, and they assumed that return quantity depends only on return policy. Based on a survey released by PWC (2000)<sup>4</sup> and CEA (2002),<sup>5</sup> consumer returns are prompted to a certain extent by quality-related problems, and not merely by refunds. Based on Mukhopadhyay and Setaputra (2004), Mukhopadhyay and

<sup>4</sup> Price Waterhouse and Coopers (PWC) Survey Report, 2000. Return to sender for online shoppers is seen as costly and difficult. Available from: <<http://www.ereailernews.com>>.

<sup>5</sup> Consumer Electronics Association (CEA) Press, 2002. Consumers want more product information from manufacturers and retailers. Available from: <<http://www.ce.org>>.

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