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Liquidity implications of reverse logistics for retailers: A Markov chain approach

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Abstract

The reverse logistics process can generate periodic negative cash flows that are difficult to predict and account for, but are important when managing retailer liquidity. Uncertainties surrounding reverse logistics create the possibility that the retailer may be strained in meeting short-run financial obligations or opportunities. The current research offers a Markov chain approach to modeling the expectations, risks, and potential shocks associated with cash flows stemming from retail reverse logistics activities. Managerial recommendations for avoiding liquidity problems stemming from reverse logistics activities are provided.

Keywords: Reverse logistics; Markov chain; Cash flows

Introduction

Retailers constantly focus on strategies to gain competitive advantage and to improve financial performance. In doing so, emphasis is more frequently being placed on logistics, including tactical initiatives such as automatic replenishment programs, real-time information sharing, and advanced demand management techniques designed to improve internal efficiencies (Li 2002; Myers, Daugherty, & Autry 1998; Seideman 2002). However, retailers also compete on the basis of effectiveness, striving for increased customer satisfaction. One competitive tactic used to enhance customer satisfaction includes the implementation of liberalized product returns policies. By taking a more "consumer friendly" approach in their return policies, retailers communicate a higher level of service to patrons, and thereby increase customer satisfaction with ultimate goals of higher sales and profitability (Coopersmith 1990; Krapfel 1988; Period & Ash 1979).

As a result of return policy liberalization, acceptance of product returns is now commonplace; returns are reported to be as high as 10–15 percent of sales in some retail industries (Rogers & Tibben-Lembke 1999), and are thought to be even higher in catalog and internet retailing, with typical return rates of up to 40 percent (Rogers, Lambert, Croxton, & Garcia-Dastague 2002). However, the acceptance of returns places stress on the retailer's logistics function. Whereas typical logistics activities are engineered to optimize flows from producer to consumer, reverse logistics activities move product, information, and currency in the opposite direction. While significant efforts have been expended in streamlining and optimizing retail logistics activities, the accomplishments associated with these activities do not always directly apply to the reverse logistics process. The forward movement of goods through the supply chain generally results in large receipts of goods at clearly defined intervals (such as when inventory levels reach critical safety levels, or at prespecified and scheduled times), with the ultimate sale executed in smaller quantities to end-users (Handfield & Nichols 2001). On the other hand, reversed supply chain flows are less predictable, occurring at various times and for various reasons, and thus, the costs of returns handling can be high (Rogers et al. 2002; Stock 1998). To guard against unexpected financial strains associated with mismanagement of returned prod-

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ucts, many retailers are attempting to make returns handling systematic by implementing formal reverse logistics programs (Rogers & Tibben-Lembke 1999; Rogers et al. 2002; Stock 1998, 2001).

The potential for a specific type of financial hardship – retailer illiquidity – is the focus of the current research. A constant objective of retail operations is to create positive net cash flows, and financial management is extremely concerned with tracking and timing the amounts of a retailer's cash inflows and outflows (Gentry & De La Garza 1990). In practice, retailers are heavily invested in liquid financial assets at any given time, with estimates of 8.6–9.1 percent of total assets during any normal period (Kim, Mauer, & Sherman 1998). Unfortunately, cash flows associated with product returns can be difficult for retailers to forecast. While returns processing activities can be customary and expected, there are many factors that could catch the retailer by surprise. An abnormally large rush of returns could cause the reverse logistics process to become overwhelmed. In addition, if key roles in the reverse logistics process begin to function improperly, their effects will then impact subsequent activities and result in an inefficient process. In such cases, since the reverse logistics process is exception-based, cash intensive, and costly to operate, the retailer could find itself in a situation when it becomes temporarily strained in meeting its financial obligations. Subsequently, the retailer's ability to address opportunities and threats posed by suppliers and consumers may be inhibited and damaged reputation and relationships or both may result. Furthermore, creditor negotiations could become more costly if unplanned shortages of funds occur. Thus, routine examination of the anticipated financial effects of short-term reverse logistics activities is critical, and should be addressed by retail strategic planning. Careful financial planning must consider the necessary resources for typical return activities, as well as situations where return processes are highly variable. Unfortunately, no empirical models are known to exist that are useful for these purposes.

The purpose of this article is to fill this void in the literature. The research identifies and analyzes some critical financial aspects of reverse logistics for the retail enterprise. In the current analysis, several different alternatives for handling and disposing of returned merchandise are examined with respect to cash flows. Identification and analysis of the cash implications of reverse logistics programs should allow retailers to make better strategic decisions affecting retailer performance. The current article reviews the literature related to reverse logistics programs, and then addresses the potential impacts of reverse logistics decision-making on retailer financial liquidity. Specifically, the paper (1) describes and illustrates the need for retail reverse logistics programs; (2) illustrates the importance of liquidity management for the retail enterprise, focusing on the retail reverse logistics process; (3) utilizes a Markov chain analysis to uncover potentially damaging liquidity positions that can result from reverse logistics-related uncertainty, variance, and systemic shocks; and (4) describes the results of a field experiment invoking the suggested analysis to illustrate the utility of the proposed model. Implications for retail management are then offered in the form of a set of normative response guidelines aimed at minimizing or controlling the impact of expected, variable, and highly volatile returns waves or all of these on the retailer's financial position.

Reverse logistics

Reverse logistics refers to a set of programs or competencies aimed at moving products in the reverse direction in the supply chain (i.e., from consumer to producer). The goal is to maximize value from returned items and insure their proper disposal or both (Rogers & Tibben-Lembke 1999). Related activities may include handling product returns, recycling, reuse of materials, waste disposal, refurbishing, or remanufacturing (Stock 1998). Operating effective reverse logistics programs is a critical part of retail business, because the programs often represent the firm's most visible and possibly final effort at recovering value from a service failure. Service failure has been studied at length in marketing publications, and at various times, has been negatively associated with customer satisfaction, customer loyalty, service quality, trust, and behavioral intentions (Brown, Cowles, & Tuten 1996; De Ruyter and Wetzels 2000; Mattila 2001; Spreng, Harrell, & Mackoy 1995). Similarly, reverse logistics programs represent an opportunity to undertake a sort of "product recovery," that if handled correctly, gives the retailer a second chance to "get it right" with the customer. Retail firms that fail to pay close enough attention to returns risk any or all of the negative effects, and additionally, miss an excellent opportunity to turn a lost sale into additional revenue. For example, following an initiative directed towards a greater focus on reverse logistics, *Sears, Roebuck, and Co.* realized over $45 million in costs savings in a three-year period (Caldwell 1999). As the result of similar successes, many firms are placing greater focus on learning more about how reverse logistics can help firms reclaim value (Autry, Daugherty, & Richey 2000; Klausner & Hendrickson 2000; Ritchie, Burns, Whittle, & Hey 2000).

Reverse logistics programs are generally comprised of a four-step system, including gatekeeping, collection, sortation, and disposition components (Rogers & Tibben-Lembke 1999). A typical retail reverse logistics system is graphically depicted in Fig. 1. Upon the initiation of a product return by the customer, the gatekeeping function (usually a retail sales associate or manager) decides which products should be allowed to enter the reverse logistics system. Due to increased liberalization of returns policies, gatekeepers are more likely than ever to accept a returned product into the system. After products have passed the gatekeeper, they are either collected in a centralized location to await processing, or are processed at the retailer SBU location. In either case, products are then periodically sorted according to their remaining utility to the