A SIMULATION MODEL OF MULTI-ECHELON RETAIL INVENTORY WITH CROSS-CHANNEL PRODUCT RETURNS

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ABSTRACT

The purpose of this study is to explore the relationship between a retailer's product returns policy—namely, a customer's option to return products across retail channels—and multi-echelon inventory system performance. This research contributes to the growing body of reverse logistics literature, offering insight into how a retailer's strategy for dispositioning returns can impact inventory performance and order fill rates across channels. While previous research has highlighted the potential for returns management to generate beneficial customer-related outcomes outside of traditional brick-and-mortar retail, little research has examined the impacts of consumer returns to supply chain performance in the presence of cross-channel integrated retail, despite a surge in retailer adoption of cross-channel business models over the past decade.

Research on the emergence of cross-channel integration in retail, colloquially termed "bricks-and-clicks" retail, and its effects on the design and performance of supply chains remain nascent within the logistics and operations literature. Cao and Li (2015, p. 200) define cross-channel integration as "the degree to which a firm coordinates the objectives, design and deployment of its channels to create synergies for the firm and offer particular benefits to its customers." [1] Oh, Teo and Sambamurthy (2012) identify integrated customer service as one of six primary dimensions by which retailers can integrate across retail channels [2]. Accepting in-store returns of on-line purchases (*i.e.*, permitting cross-channel returns) is one form of integrated customer service and is a hallmark characteristic of channel-integrated operations [3].

Several authors have noted that a retailer's ability to offer a cross-channel product returns policy is influenced by firm production and inventory activities. However, research is needed to determine the nature of these relationships. A growing body of literature has emphasized the importance of designing reverse supply chains to accommodate returns. Blackburn, Guide, Souza, and Van Wassenhove (2004) note that retailers make trade-offs in reverse supply chain design between the speed of recovering product value and operational costs [4]. Some retailers might realize cost efficiencies though centralized evaluation, testing and disposition of returned products [5]. For other retailers, including those challenged by seasonal demand, product spoilage or obsolescence, costs incurred because of longer disposition cycles, in-transit product damage or pilferage may negate efficiencies gained from centralized returns processing.

Resource Orchestration Theory suggests that firm value is generated through a synchronized structuring, bundling and leveraging of resources by managers [6]. We test various resource

bundles in a 2 × 2 × 2 experimental design using discrete-event simulation. Model parameters are derived from empirical data collected from a Fortune 1000 retailer of consumer durable and non-durable goods. Differences in inventory system performance are analyzed for multi-channel and cross-channel returns policies with centralized and decentralized returns processing and with and without seasonal demand. Results of the analysis highlight the need for retailers to integrate inventory and logistics functionals into firm strategy decisions regarding cross-channel integration.

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