

Dual-Channel Supply Chain Coordination With BOPS and a Revenue-Sharing Contract

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ABSTRACT

The omni-channel strategy buy-online-pickup-in-store (BOPS) is used to cater to customers who want a consistent service experience in different channels. In this paper, the author thinks of BOPS as an effective strategy for encouraging some online customers to switch to offline stores with high online return losses. The author first studies an omni-channel supply chain with centralized and decentralized decision making and explains why online returns hurt the supply chain with respect to the matching rate and the unit return loss. Although different channels can be operated by the same firm or different firms, the author studies how to coordinate the entire chain using a revenue-sharing contract. When online return losses are high, it is effective to adopt BOPS to reduce online return losses; otherwise there is no need to do so. Finally, the author presents numerical experiments, including a special case, and shows that in many cases using an appropriate revenue-sharing contract under the proposed mechanism can increase the profits of the entire supply chain and its members.

KEYWORDS

BOPS, Dual-Channel Supply Chain, Online Customer Returns, Product Matching Rate, Revenue-Sharing Contract

1. INTRODUCTION

Online retailing has developed rapidly in recent years. As customers become accustomed to online shopping, many manufacturers and brick-and-mortar retailers have supplemented their traditional channels with online channels. The online channel has initially been perceived as competition to stores, and early studies have focused on solving channel conflicts. Currently, firms realize the need to integrate multi-channels into their operations to satisfy customers' needs, as customers usually obtain information online before shopping. For example, the brick-and-mortar channel can attract customers by its good service, and the online channel can give customers more conveniences by information availability or home delivery. Is there any way to integrate the advantages of different channels? As a result, "Omni-channel retailing" is proposed. For it can provide customers with a seamless shopping experience through all available shopping channels, it is considered as a new way of firms' development (Bell et al., 2014). The omnichannel environment provides customers more information on their purchasing strategies. In particular, a customer may either buy the product in a brick-and-mortar store and choose a home delivery service; purchase the product online and choose a BOPS strategy if he wants to get the product sooner; or search online for more information about

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the product and find a nearby store from which to buy the product if he is hesitant to shop online. Moreover, if a customer uses BOPS and finds that the product does not match his expectations, he can return the product to stores without the need to post it back to online retailers. In a nutshell, a customer has more choices in an omni-channel environment relative to traditional retailing. From the retailers' perspective, a BOPS strategy can attract more customers to offline stores. When a customer picks up the package from the store, he may know soon whether the product matches his expectations, which lowers the return losses for both the retailer and the customer, or the customer may purchase a different product from the store, which is likely to increase the store's profits. These cross-channel effects can increase the profits of offline stores.

Although an omni-channel environment provides numerous benefits, it also introduces many new challenges. This paper focuses on supply chain coordination. For example, while the buy-online-pickup-in-store option may be offered to customers, the online channel should cooperate with offline stores to coordinate their sale strategies. This cooperation requires not only the integration of a member management system but also that of the entire supply chain, including sales, pricing, and inventories. When a retailer has both online channels and offline channels with centralized decision making, it is straightforward to coordinate the different channels. In contrast, when the channels are controlled by several independent firms with decentralized decision making, each firm strives to maximize its own profits, resulting in a vertical and horizontal competition that hinders omni-channel integration. At the same time, the supply chain must decide what portions of the store's inventory should be allocated to the online and offline channels and how to allocate profits between the two channels.

In this paper, the author considers omni-channel coordination with a BOPS strategy. Some online customers use BOPS to save waiting time, reduce delivery fees or for other reasons. However, the firms that operate the online and offline channels may be independent for many goods are sold by agents. For the BOPS strategy to be used successfully, dual-channel coordination mechanisms are indispensable. In this paper, the author focuses on the following three questions:

- How do online customers' returns affect the profits of the supply chain and its members?
- Should the supply chain controller adopt a BOPS strategy to coordinate the online and offline channels?
- What mechanisms including a BOPS strategy can the author design to allocate profits in the omni-channel supply chain?

The remainder of the paper is organized as follows. Section 2 introduces relevant literatures on omni-channel retailing and supply chain coordination. Section 3 describes the research problem with the BOPS strategy in the omnichannel environment. Section 4 works out the prices and profits of the supply chain under centralized decision-making, decentralized decision-making and coordination with revenue-sharing contracts. And then numerical analysis are presented to propose an optimal management strategy and verify the effectiveness of revenue-sharing contracts. Section 5 concludes.

2. LITERATURE REVIEW

This paper studies the problem of the coordination of online and offline channels with omni-channel strategies. There have been a few studies on omni-channel retailing. Verhoef et al. (Verhoef et al., 2015) discussed the transition of supply chains from multi-channel to omni-channel mode, explained the potential impact of this transition on supply-chain management and noted three possible future research directions. Hübner et al. (Hübner et al., 2016) presented several structural models of the last kilometer in omni-channel operations and compared their advantages and disadvantages. Gao and Su (Gao & Su, 2016a) analyzed the BOPS strategy and found that it had a significant impact on consumers' purchasing behavior. Their results showed that consumers would always choose the

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