Competition and Coordination in a Dual-Channel Supply Chain With Asymmetric Retailers

YuHang Zhang, College of Economics and Management, Nanjing University of Aeronautics and Astronautics, Nanjing, China
Ying Wang, College of Economics and Management, Nanjing University of Aeronautics and Astronautics, Nanjing, China

ABSTRACT

This article studies competition and coordination in a dual-channel supply chain where one supplier supplies homogeneous products to multiple asymmetric retailers, meanwhile, selling products to the end consumers acting as retailers, through a two-level Stackelberg game. This article first studies the asymmetry among the retailers in terms of the different characteristics of the cost, price, quantity. This article finds that a supplier’s profits increase when the number of retailers are high enough in the retail market, even though the retail price of the retailers is lower than that of the supplier, or the wholesale price is cut down when there are many retailers competing in the retail market. On the other hand, under certain conditions, the efficiency of supply chain goes to 1. In this article, the authors show that some traditional contracts that can perfectly coordinate the single-channel supply chain, while failing to coordinate the dual-channel supply chain. Therefore, this article puts forth a linear quantity discount contract and first proves it can be applicable to the dual-channel supply chain with asymmetric retailers under a certain special condition where the lead retailer exits the retail market. The authors examine contracts which can reduce the loss of the efficiency, though they cannot completely coordinate a dual-channel supply chain.

KEYWORDS

Asymmetry, Contracting, Dual-Channel, Stackelberg Game, Supply Chain Management

1. INTRODUCTION

As the fast-moving superstores, e.g. Walmart, the Hua-lian supermarket and other specialty superstores, give retailers significant power to attract consumers in the recent two decades, these retailers capture a percentage of the profits of middleman, in which way suppliers sell to the downstream retailers. Due to the maximization of profits, except the way that is aforementioned, suppliers choose to face the end consumers directly to get the portion of profits obtained by shrinking the supply chain, like Nike and Apple, they have their own brick-and-mortar stores. The way that many suppliers have engaged in selling directly to the consumers online helps manufacturers save cost, increase sales revenue and open up new markets (Chen 2012), and has significant influence on the patterns of customers’ purchase. Consequently, many suppliers satisfy demand from the segment market through dual-channel supply chain, to compensate the portion of market segments which the indirect channel can’t reach. While the price provided by the suppliers is higher than that from the retailers, especially the network marketing platform in the real world. So why do suppliers sell products to retailers who
sell the same titles in a lower price? In this study, we investigate the motivation of one supplier who sells products they produce to retailers with which they also compete by a direct channel. We propose the source of product comes from only one supplier, and without loss of generality, allow for the differences at the retail level in both the product itself and the consumers’ preference in purchasing one retailer or the others.

Of particular interest is the retailers presented in our paper, which we propose there is relatively only a bigger one than others about the comprehensive market competitiveness. When these retailers are asymmetric, the externality imposed by one retailer will have an influence on the others, and lead to the loss of profits in the supply chain (Dimitris 2013). We first analyze the equilibrium of the pricing and quantity strategies between one supplier and multiple asymmetric retailers through two-level Stackelberg game in which supplier is leader and retailers are followers, and in the second level the bigger retailer is leader and the other retailers are followers which we propose as symmetry. In addition, we find the common contracts cannot coordinate dual-channel supply chain by comparing with revenue sharing contract (RSC) and price discount sharing (PDS), which they are apt perfectly to traditional single channel supply chain, and then we suggest an effective contract, that is linear quantity discount contract (QDC).

This paper focuses on competition and coordination in a dual-channel supply chain with asymmetric retailers through two-level Stackelberg game. And there is vast literature related to dual-channel supply chain. Thus, in the following, we will elaborate literature including dual-channel supply chain competition, RSC, PDS, linear QDC and coordination and equilibrium between one upstream supplier and multiple downstream retailers which are reviewed and analyzed.

2. LITERATURE REVIEW

The literature related to dual-channel supply chain mentioned by Tulika et al. (2015) comes down to two streams related to both channel competition and coordination dealing with the various contracts within supply chain.

Some scholars have studied channel competition since the 1980s, one of who suggested a simple framework indicating the competition is the function of channels, within which including the nature of channel structure and demand (Jeuland 1983, Farooq et al. 2005). The research on the channel competition has opened the prelude since then. Chiang et al. (2003) suggested that retailers can capture profits from direct channel, due to the reduction of the wholesale price taken by the supplier adopting a price-setting game in the dual-channel supply chain. While most scholars, like Dumrongsiiri et al. (2008), Bernstein et al. (2009) indicated the direct channel had an inherent bad influence on the retail channel in terms of consumers’ preference, common heterogeneous price, and Chen et al. (2008) had the same point, who suggested direct channel mechanism can be used to influence the price of retailers, and they considered the dual-channel structure can be used to compensate market imperfections which are caused by each other and occupy the different segment market according to their own advantage. In contrast to these literature reviewed, we find that direct channel operated by the supplier has good effect on her even though the price is lower than that of the retailers, the concrete reasons will be elaborated in what follows.

Allen et al. (2000) mentioned that there were several methods to coordinate the channel competition, and Cachon (2003) and Cai (2010) supported this view, they indicated channel coordination can de-escalate the channel conflict and yield more profits to stakeholders. Most companies have realized that the coordination within the supply chain can yield more profits than that generated from competition. After nearly three-decades development, the methods coordinating stakeholders among the supply chain have been studied qualitatively and quantitatively, e.g. quantity discount (QD) (Rui 2016, Burnetas 2007, Amy 2015), RSC (Cachon 2005, Liu 2015, Erbao 2014, Tal 2015), PDS (Bernstein 2005), buyback policies (BB) (Emmons 1998, Psternack 1985) and sales rebate (SR) (Taylor 2002) contracts, with which companies improve their supply chain performance.
Retrofitting Information Processes and Content Standardization in Response
to Enterprise-Wide System Planning and Development: Organizational and
Socio-Technical Influences as Determining Factors
www.igi-global.com/article/retrofitting-information-processes-content-standardization/2088?camid=4v1a

Enterprise Resource Planning (ERP) Implementations: Theory and Practice
www.igi-global.com/article/enterprise-resource-planning-erp-implementations/2136?camid=4v1a