Coordination and benefit sharing in a three-echelon distribution channel with deteriorating product

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Abstract

This paper proposes two hybrid contract-bargaining processes—backward and forward, aiming at channel coordination and benefit sharing in a manufacturer-multiple distributors-multiple retailers supply chain that deals with a deteriorating product. The hybrid contract consists of quantity discount that the manufacturer provides to distributors and compensation on deterioration cost, which distributors provide to retailers. Although both processes coordinate the channel and distribute benefits, distributors prefer backward contract-bargaining but retailers and manufacturer prefer the other. Moreover, without receiving quantity discounts, distributors can coordinate the channel by providing compensations on deterioration costs, which may be larger than deterioration costs. A numerical example explains the model.

Key words: Channel coordination; deterioration; quantity discount; compensation on disposal cost; bargaining.

1. Introduction

In a decentralized supply chain that consists of one manufacturer, multiple distributors and multiple retailers under each distributor, the decisions are suboptimal (Cárdenas-Barrón & Sana, 2015; Aljazzar et al., 2016; 2017) because each channel member seeks to minimize its own cost. Ideally the success of individual channel member depends on overall channel success. So, the coordination among channel members is needed for improving channel wide performance. To cut out channel conflict, coordination contracts are used to align all the channel members’ decisions with the channel best decision. The coordination contracts differ by contractual classes among the channel members. Interestingly there is no universal coordination contract that effectively resolves channel conflict because performance of a coordination contract depends heavily on the supply chain characteristics (Zhang & Liu, 2013; Bazan, Jaber & Zanoni, 2015). Several coordination contracts e.g. quantity discount (Panda et al., 2015), buy back (Chen & Bell, 2011), two part tariff (Modak et al. 2016a), quantity flexibility (Chung et al., 2014), revenue sharing (Modak et al., 2016b), sales rebate (Lan et al., 2015) are used to resolve channel conflict. Majority of these contracts addresses two-echelon supply chain coordination rather than discussing double marginalization in three-echelon supply chain. Munson & Rosenblatt (2001) developed a three-level
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