



5th international conference on opportunities & challenges in MANAGEMENT, ECONOMICS & ACCOUNTING

29 – 31 August , 2019 Berlin, Germany

Optimal Financial Operating Policy for the Supply Chain under Uncertainty

Po-yuan Chen

Department of Financial and Tax Planning, Jinwen University of Science and Technology, Taiwan

Abstract

We propose a supply chain model covering two markets: supply and consumer markets. In the supply market, the supplier delivers the work-in-process to the retailer for further processing and then the retailer delivers the finished goods to the final consumers or carries them as inventories, depending on the difference of output rates of both the supplier and the retailer. If the output rate of the supplier is greater than that of the retailer, inventories are accumulated. Otherwise, the inventories are shipped to the consumers. The price in the consumer market evolves as a stochastic process of Brownian motion due to the highly competitive structure in the consumer market. Our purpose is to find out the price threshold, which enables the collaborative maximum-earnings sale in the supply chain. The related cost structure of the supply chain is a convex quadratic function. Based on our proposed marginal cost functions for the supplier and the retailer, the optimal output rates are derived analytically by the cooperative game-theoretic approach. Once the real options have been exercised, the payoff is the profits from the total sale in the supply chain. As a result, the overall value of the supply chain is a stochastic earning process. Our major contribution is the integration of uncertainty and inventory issues, as well as managerial flexibility for the practice of day-to-day operations in a supply chain. This paper concludes with analytical solutions for optimal output rates for both the supplier and the retailer, the price threshold to activate the goods delivery in the supply chain, and the optimal value of the collaborative supply chain under uncertainty.

Keywords: game; optimal output rate; price threshold; real options; uncertainty