

## **Abstract**

With a cosmetics company as a background, this thesis mainly studies a supply contract between a manufacturer and a retailer under which a retailer receives discounts for committing to purchase products before the point of differentiation. The retailer can adjust the order quantities after the trial period based on updated forecast demand and inventory status by paying a higher per-unit cost for the incremental units or giving up the deposit. Such contracts are popular in the cosmetics industry based on fast-moving consumer goods. Given the manufacturer's price structure, we first develop a two-period dynamic programming model to optimize the replenishment strategy for the retailer. We then further derive the optimal production quantities for the manufacturer. Numerical results show that the material quantities are very different with and without using postponement strategy.

**Keywords** Supply contract, inventory, postponement, material commonality, dynamic program