

Abstract

Accompany with the development of economics and technology, companies face fierce competition problems in the global environment. Under these pressures, the improvement of customer satisfaction and the control of the total cost become serious problems to the managers in service systems. Inventory positioning problem becomes extremely important and complex in this stage.

In this thesis, we developed a general model for the inventory positioning problem in a multi-item service network with two replenishment modes (sometimes called supply modes in this thesis) which is activated from a real consultation project. The normal replenishment is done according to a periodic review order-up-to policy, and express delivery is done any time when there is a demand that can't be filled from the local inventory. Different from the general approach of using express delivery as emergency handling method only in inventory literature, we focus on the tradeoff between transportation cost and inventory cost where express delivery does not affect the service level but only the transportation cost. Based on the characteristics of the real project, we have successfully translated the multi-item network problem into single item single location inventory control problem. This single item single location control problem is then solved as an optimization problem that decides on the optimal order-up-to level that minimizes the total inventory cost and transportation cost. Our explicit results show that the optimal order-up-to level is affected by the difference of unit cost of normal

delivery and express delivery, the normal delivery lead time, the product value of the item, the length of review period, the demand rate of the product, and the inventory holding cost per unit per time period. For example, when the two delivery costs are close, and/or the demand rate is very slow, and/or the product value is very high, one should always use the express delivery.

Key words: inventory positioning, two supply modes, network, stochastic demand