

Public Abstract

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Title:AFTER SALES SERVICES FOR REPAIRABLE PARTS WITH SERVICE LEVEL AGREEMENTS

In this study, inventory systems for repairable parts with service level consideration are studied. The first study develops a multi-parts inventory system and transportation decisions. The objective is to find the base stock levels and shipping modes that maximizes the total fill rate within a given budget. An optimization model is developed and an approximation method is used to eliminate the highly non-linearity of the objective function. The results of numerical experiments show the benefits of alternative transportation mode under tight budgets, where the supplier can increase his performance with the same budget limit.

A two-echelon repairable-parts inventory system is considered in the second study, where emergency purchasing and ordering from the central warehouse are allowed to obtain higher service level. A dynamic decision making model is developed that minimizes the system's operational costs and provides the required service level over the contract period. The numerical experiments show the benefits of purchasing and ordering options in systems with high penalty costs and long repair times. The model also shows the supplier can reduce their expected costs by pooling inventory at the central warehouse for multi-stock locations.

In the previous studies, we assumed that the contractual terms are given to the supplier and are considered as fixed parameters. The main focus in the last study is providing the contractual terms to the supplier that prompts him to provide a better service performance during the contract. The decision maker in this system is the customer, and he requires a minimum service level from the supplier. The customer is willing to grant the supplier for a better service performance by providing incentives. The objective is to find the terms of contract, the fixed payment, incentives and contract duration, that maximize the service provided by the supplier during the planning horizon under a constrained budget. We first develop a mixed integer programming model assuming the information on the supplier's cost and service is visible to the customer. Then, we extend our model to a robust model in which the uncertainty of information is included. The analysis suggest the required budget that increase the percentage of acceptance and the expected fill rate from the supplier.