A Study of Theory of Constraints Supply Chain Replenishment System

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Abstract

An effective inventory replenishment method implemented in the supply chain is one of the key success factors to achieve low inventory while maintaining high customer delivery performance. The Theory of Constraints (TOC) Supply Chain Replenishment System (TOC-SCRS) is one of the solutions to get this improvement in a multi-echelon supply chain. The TOC-SCRS is a replenishment method of the TOC supply chain solution. The TOC is a global managerial methodology that helps the manager to concentrate on the most critical issues. The TOC-SCRS is based on the following two strategies to decouple the bullwhip effect (or excess inventory in each node) and maintain the inventory availability to consumers (next nodes): (1) each node holds enough stock to cover demand during the time it takes to reliably replenish; (2) each node only needs to replenish what was sold. The TOC-SCRS is now being implemented by a growing number of companies. The performance reported by the implemented companies includes reduction of inventory level, lead-time and transportation costs and increasing forecast accuracy and customer service levels. However, the exploration of TOC-SCRS is lack in the literature. In this study, the concept and method of TOC-SCRS is first reviewed and modeled. A virtual supply chain case is secondly designed to show the behavior of the TOC-SCRS. A three factorial experiment, i.e., fluctuation of demand, time of replenishment and frequency of replenishment, is then presented to explore the feasibility and effectiveness of TOC-SCRS. A simulation model is designed to complete the experiment.

Keyword：Supply Chain Management, Inventory Replenishment, Theory of Constraints, TOC Supply Chain Replenishment System