

供應鏈策略對供應鏈長鞭效應影響之研究

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摘 要

在長鞭效應的研究中，以往均是在簡單二階供應鏈下，探討前置時間與需求預測方法對長鞭效應的影響。本研究主要目的即在分析在一個二階供應鏈的架構下，分別採用不同供應鏈策略，對長鞭效應、平均庫存、缺貨率的影響。供應鏈策略包括即時生產流程、持續補貨計畫、簡單二階供應鏈策略等四種不同的策略。其中簡單二階供應鏈策略在需求預測上使用移動平均法，在存貨策略上使用存貨上限策略，即時生產流程則將需求分為訂單需求與非訂單需求，訂單需求可即早反應在訂購量上，非訂單需求則依需求預測與存貨策略過程運作。持續補貨計畫則無需求預測的需要，僅需要不斷補充存貨至存貨上限點。另一種持續補貨計畫則是設有安全存量，僅在庫存低於安全存量時才訂購至存貨上限點。依據所構建的數學模式進行模擬分析與個案研究，可以找出各供應鏈策略之關鍵控制變數對長鞭效應、平均庫存、缺貨率之關係。

本研究結果顯示使用簡單二階供應鏈策略或持續補貨計畫策略下，長鞭效應的降低會造成庫存的增加或缺貨率的提高。僅即時生產策略可在提高訂單需求比例時，同時使缺貨率與平均庫存下降，且在長鞭效應上，越高比例的訂單需求，上下游需求的差異越小。此外前置時間的增減對長鞭效應、平均庫存、缺貨率有絕對的影響，且對各供應鏈策略均有相同的情況，即前置時間增加使長鞭效應加大、平均庫存提高，缺貨率上升。

關鍵字：長鞭效應、即時生產策略、簡單二階供應鏈、持續補貨計畫

A Study on the Supply Chain Strategies Influence of Bullwhip Effect Under Various

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ABSTRACT

In the research field of bullwhip effect, most studies discussed the impact of lead time and demand forecast method to bullwhip effect under a simple two-stage supply chain structure. The purpose of this study is to analyze the influence of different supply chain strategies under a two-stage supply chain structure on the bullwhip effect, average inventory and the out of stock rate.

Four supply chain strategies are selected in this study, which include just in time strategy (JIT), continuous replenishment program strategy (CRP), simple two-stage strategy etc. In the simple two-stage supply chain, it uses moving averaging method in demand forecast, order-up-to policy in inventory strategy. In JIT strategy, the demand is divided into order demand and non-order demand. Order demand can be reflected in order quantity in advance, and the non-order demand need to be predicted. The CRP strategy just need to replenish the inventory to the upper limit of inventory. Another strategy of CRP sets a safety inventory standard, and the quantity ordered is the difference of the upper limit and the inventory at that time, whenever the inventory is under the safety standard.

Based on the models developed in this study, and results of simulation and case study, we can find the relation between the control variables of all supply chain strategies and the bullwhip effect, average inventory, out of stock rate can be analyzed. In simple two-stage supply chain and CRP strategy, damping the bullwhip effect result in the increase of inventory and the out of stock rate, only JIT can decrease the inventory and the out of stock rate at the same time when the proportion of order demand is increased. In the bullwhip effect, higher proportion of order demand, will

reduce the difference of upstream and downstream supply chain.

Besides, change of lead time has absolute impact on the bullwhip effect, average inventory, out of stock rate for all the four supply chain strategies. The longer the lead time, the higher the bullwhip effect and inventory, as well as the higher out of stock rate.

Keywords : Bullwhip Effect, Just In Time Strategy, Simple Two-Stage Supply Chain, Continuous Replenishment Program

