

Evaluating supply chain flexibility under demand uncertainty with smoothing approach and VMI considerations

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Abstrak

ABSTRACT

In this paper, we develop a four stage procedure for evaluating and improving a suppliers volume flexibility. In the first stage, we use historical demand data to develop a model for forecasting their future quantities. In the next stage, we develop an algorithm for smoothing the forecasted future demands. We show that applying this algorithm not only reduces production fluctuations and damages, but also improves the flexibility of the supplier and hence the overall supply chain. We investigate the economical conditions of applying this algorithm. In the third stage, by considering the forecasted future demands, we develop a mathematical single-period flexibility measure. In the fourth stage, the developed measure is extended to a multi period model for applying in the multi period supply collaborations and especially in the VMI systems. Furthermore, we consider weight coefficients for taking into account the different importance of flexibility from the buyers perspective over the time horizon. By applying in a real case study about an oil refinery, we verify the developed model and investigate the effects of its parameters through the sensitivity analysis.