

A Simulation Study of Supply Chain Inventory Management Considering Carbon Emissions and Perishable Commodities

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ABSTRACT

The ultimate goal of company and enterprise operations is to pursue the greatest interest. In addition to the operation mode and reduction of material cost, inventory management is also a very important part. Nowadays, all industries examine the impact of inventory on cost. A good inventory management system can help decision-makers implement effective ordering strategies and reduce inventory related costs. These days, due to the impact of global warming, many enterprises take carbon emission costs into consideration during decision making process, making the whole supply chain system more complete and closer to actual situations and achieving the ultimate goal of low cost.

This study adopts the (s, Q) inventory strategy and incorporates the costs of carbon emission into the two-echelon supply chain system. With the goal of reducing inventory related costs, the study explores the effect of integrating two-echelon supply chain system with carbon emission and uses Flexsim simulation software to build a research model for experiments. After the verification of the model and the confirmation of its correctness and reliability, the study looks into how costs of transport carbon emissions of general commodities and perishable commodities affect the variation in the total cost of the supply chain system in order to understand the cost variation of different factors settings and its underlying reasons. Furthermore, the optimization function of the simulation software is used to obtain the optimal order quantity and reorder point for retailers and suppliers to determine the lowest total cost. The experimental results show that when the model includes carbon emission costs, retailers and suppliers tend to increase the order quantity and reduce the

number of orders. On the other hand, when it comes to the spoilage factor, retailers' inventory system does not show significant change, but suppliers tend to reduce the order quantity to avoid spoilage.

Keyword: Supply chain system 、 Carbon emission 、 Perishable commodities 、 Simulation 、 Flexsim