

Ideation Phase – Literature Survey

Date	19 September 2022
Project Name	Project - Inventory Management System for Retailers

1. Lan Teng, Zhenji Zhang, et al, “Integrated Inventory-Transportation Problem in Vendor-Managed Inventory System”, 2019.

The paper presents a two-echelon inventory-transportation problem in Vendor Managed Inventory (VMI) system. We consider a distribution system composed with single supplier, single distribution center and multiple retailers. Single kind of products are required to deliver from the manufacturer through distribution center to the retailers within soft time window. A mixed algorithm is designed to solve the problem with simulated annealing and ant colony with local search. The solution of upper and lower echelon model are substituted into each other based on the mixed algorithm step by step to get the optimization solutions.

2. Soonkyo Lee, Young Joo Kim, et al, “Effects of Yield and Lead-Time Uncertainty on Retailer-Managed and Vendor-Managed Inventory Management”, 2019.

Generally, there are various elements of uncertainty in a supply chain. In particular, uncertainties in lead time, demand, and yield are very important in the semiconductor industry. Higher uncertainty can lead to bullwhip effects that can undermine the performance of the entire supply chain. This study examines the relationship between uncertainty in the supply chain and the outcome of inventory replenishment policies. Specifically, we analyze the effects of well-known uncertainties on manufacturer production quantity and retailer order quantity decisions in a decentralized supply chain. Using numerical experiments, a comparative analysis of the two alternatives is conducted to determine suitable options for improving supply chain performance.

3. Lijun Ma, Can Wang, et al, “The Influence of Supply Chain Finance on Inventory Management Under Supply Uncertainty”, 2018.

It's well known that small and medium-sized enterprises(SMEs) occupy a significant position in Chinese economy. However, in credit practices, SMEs are often considered as high-risk lenders who often need to pay higher capital costs to obtain funds. This paper explores (1) debt financing can distort a retailer's inventory decision when the retailer with limited funds and selling multiple products with different price, cost, revenue, and yield uncertainty parameters; (2) we also explore the role of each parameter in this distortion. Because of the limited liability, a debt-financed retailer prefers items with high

selling price, high penalty factor(late delivery) and low salvage value. Furthermore, based on the fact that the capital cost of suppliers has always been higher than that of banks, we discuss that this distortion can be mitigated when the financing is provided by the supplier who can observe the actual order quantities before determining the credit terms. On the other hand, based on the fact that the capital cost of suppliers has always been higher than that of banks, we studied the combination of bank and supplier financing to enable retailers to achieve the best way of financing.

4. Lin Li, Zhaojun Yang, et al, ““Buffer Inventory + Information Sharing” Strategy for Retailers in Two-Level Fresh Supply Chain”, 2020.

In the supply chain of fresh agricultural products in China, there are huge commodity losses during the transportation and storage of agricultural products due to limitations in cold chain logistics technology, which affects the performance of the fresh supply chain. This paper aims to improve the accuracy in forecasting market demand and reduce inventory by studying the impact of information sharing strategies on inventory and revenue at all levels of the supply chain, by establishing a system dynamics model that analyzes the capability of information sharing to reduce the expected inventory of suppliers and retailers, and by examining the impact of information sharing on demand forecasting accuracy and inventory stability. Results show that the strategy of information sharing combined with setting the buffer inventory can better improve the performance of the fresh produce supply chain.

5. Abhijit Barman, Rubi Das, et al, “Pricing and Inventory Decisions of Multi-item Deteriorating Inventory System under Stock, Time and Price Sensitive Demand Policy”, 2021.

In most of the inventory like food, fashion, electric materials, building materials, a retailer needs to maintain varieties of different inventory items. On the other hand, racks overflowing with a large number of quantities in an inventory attracts the attention of more customers. Besides, the selling price is a crucial factor in demand based on marketing and economic theory. Assimilating all these variates, the present paper advocates a multi-item single-period inventory model that generalizes the pricing and inventory policy for instantaneous deteriorating items. An iterative algorithm has been incorporated to find the optimal procedure. The prime objective of this model is to determine the selling price, time length up to zero inventory, optimal lot size so that the profit of the retailer will be maximized. The model is demonstrated with a numerical example which is followed by a sensitivity analysis.

6. Zhang Zhenmin, Li Lin, “Perishables Inventory Management Model with Backroom Effect”, 2020.

This paper considers two storage locations (shelf and backroom) in supermarket selling perishable products. Due to the backroom effect, the products with higher freshness are periodically replenished from backroom to shelf, where freshness-and-shelf level-sensitive consumers purchase the products according to their "perceived average freshness" of displayed fresh products. Then it develops the decision-making model including shelf replenishment period and reorder point, and the neighborhood search algorithm is designed to solve this model. Finally, it conducts groups of numerical examples revealing the impact of the backroom effect on the retailer's optimal order quantity, shelf replenishment period, and reorder point. The main results show that retailers who ignore the backroom effect will miss out on market share and profit margins. When the retailer realizes the existence of the backroom effect, he should increase the order quantity to obtain a higher profit value.

7. Yantong Li, Feng Chu, et al, “Integrated Production Inventory Routing Planning for Intelligent Food Logistics Systems”, 2018.

An intelligent logistics system is an important branch of intelligent transportation systems. It is a great challenge to develop efficient technologies and methodologies to improve its performance in meeting customer requirements while this is highly related to people's life quality. Its high efficiency can reduce food waste, improve food quality and safety, and enhance the competitiveness of food companies. In this paper, we investigate a new integrated planning problem for intelligent food logistics systems. Two objectives are considered: minimizing total production, inventory, and transportation cost and maximizing average food quality. For the problem, a bi-objective mixed integer linear programming model is formulated first. Computational results on a case study and on 185 randomly generated instances with up to 100 retailers and 12 periods show the effectiveness and efficiency of the proposed method.

8. Ji Quan, Xiaofeng Wang, et al, “Effects of Consumers’ Strategic Behavior and Psychological Satisfaction on the Retailer’s Pricing and Inventory Decisions”, 2019.

This paper introduces a concept of psychological satisfaction to describe the utility of customers under different psychological perception. The following conclusions are got in this study. (i) Compared to psychological neutral strategic consumers, the behavior of the psychological elation strategic consumers will

further induce the retailer to lower price and reduce inventory, thereby further damaging the profits of the retailer. And the stronger the emotion of psychological elation, the greater the loss of damage. (ii) The behavior of disappointment aversion strategic consumers will alleviate the adverse effects of their strategic behavior on the retailer's profit to a certain extent. And the stronger the disappointment aversion emotion, the more obvious the alleviating effect it has. (iii) Considering the effect of consumers' psychological satisfaction. The profit of the retailer is positively correlated with the valuation of consumers, but the relationship between the retailer's profit and product cost or the salvage price depends on other parameters.

9. Michael V. Basin, Fernando Guerra-Avellaneda, et al, “Stock Management Problem: Adaptive Fixed-Time Convergent Continuous Controller Design”, 2021.

This paper presents an adaptive fixed-time convergent continuous controller designed to solve a stock management problem with the objective to drive stock and supply chain levels at the reference values, subject to loss rate disturbances whose bounds are unknown. The only measurable state of the supply chain is the inventory retailer stock level, whereas the supply line inventory level should be estimated. The designed controller includes a fixed-time convergent differentiator, an adaptive fixed-time convergent disturbance observer, and a fixed-time convergent regulator. The controller design is validated in a case study of stock management. The calculated upper estimate for the total settling (convergence) time and the obtained simulation results confirm the fixed-time convergence and the robustness of the designed controller.

10. Wanying Jia, Zhencai Wu, “Impacts of consumer market search behavior on retailers' decision-making: a CVaR analysis”, 2019.

In recent years, the impact of human behavioral issues on the supply chain decision making is to arouse higher attention, such as risk attitude and so on. Behavioral factors, such as risk aversion, can directly influence a manager's procurement decisions. In this paper, we focus on the impact of a retailer's risk aversion on its decision making considering the consumer market search behavior. We use the CVaR to evaluate retailer's risk preference and select a single product supply chain system, which consists of one manufacturer and two retailers. By the theoretical analysis, we find that the customer market search behavior can promote the retailers' order quantity, for there is probability that retailers are in short supply. So the retailer with risk aversion should make a trade-off and we explore the bilateral influence of risk attitude and shortage penalty.