DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

IBM - LITERATURE SURVEY

PROJECT TITLE

INVENTORY MANAGEMENT SYSTEM FOR RETAILERS

(2022-2023)

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FINAL YEAR B.E (CSE)

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1. Effects of Yield and Lead-Time Uncertainty on Retailer-Managed and Vendor-Managed Inventory Management

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 analyse the effects of well-known uncertainties on manufacturer production quantity and retailer order quantity decisions in a decentralized supply chain. In addition, we also analyse and compare the effects of these uncertainties for the retailer-managed inventory and the vendor-managed inventory policies. Using numerical experiments, a comparative analysis of the two alternatives is conducted to determine suitable options for improving supply chain performance. In general, the performance of vendor-managed inventory is better than that of retailer-managed inventory, but we observe from the numerical experiments that there exist circumstances under which retailer-managed inventory shows better supply chain performance.

2. Effects of Consumers' Strategic Behaviour and Psychological Satisfaction on the Retailer's Pricing and Inventory Decisions

This paper introduces a concept of psychological satisfaction to describe the utility of customers under different psychological perception. It studies the purchase behaviour of strategic customers based on their psychological satisfaction and analyses its impacts on the optimal pricing and inventory decisions and the corresponding profit of retailers. The following conclusions are got in this study. (i) Compared to psychological neutral strategic consumers, the behaviour 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 behaviour of disappointment aversion strategic consumers will alleviate the adverse effects of their strategic behaviour 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 retailer's pricing is positively correlated with product cost and the valuation of consumers, and negatively correlated with the salvage price. The retailer's inventory is positively correlated with the salvage price and the valuation of consumers, and negatively correlated with product cost. 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.

3. Research on the Optimization of Retailer Inventory Strategy based on System Dynamics Simulation

Aiming at a satisfying inventory strategy, simulation was put into use in a dynamic system. In this paper, we focused on a simply two-stage supply chain inventory management system. The model of inventory system was simplified rationally, and we assumed that it was primarily consisted of a manufacturer and a retailer. The study based on the theory of System Dynamics and VENSIM software was used to optimize variable parameters in the supply chain inventory system. The retailer inventory strategy was optimized under uncertain environment and the variable parameters of adjustment production time, demand production delay time and demand

sale time were reset, and then a rational inventory management project was selected in this system. Finally, an example was come up with and it showed that the method was feasible and a better retailer inventory strategy was proposed.

4. Arena simulation model for multi echelon inventory system in supply chain management

Supply chain inventory management (SCIM) is an integrated approach to the planning and control of inventory throughout the whole network of cooperating organizations from source of supply to the end user. Research shows that Multi Echelon Inventory System can help companies save costs. In this paper, simulation model is being developed for multi echelon inventory system in supply chain using Arena 7.0. Model consists of three active members in it: One distribution centre, three retailers and customer. Our model focuses on improving sales and reducing lost sales by introducing the interrelationship among retailers. The simulation results show that interrelationship with sharing inventory among retailers will help retailers increase their sales.

5. Comparison analysis of vendor managed inventory with consideration of transportation and inventory costs

In this paper we built up a one supplier-two retailers supply chain cost-computing model, with parameters of costs in transportation, uploading & loading, ordering cost per time for retailer, demanding rate of retailer and yearly storage costs of supplier and retailer. Through computing and analysing of a practical example, the results show: 1) In the condition of considering transportation fee and ignoring this fee, the whole cost of supply chain system reduces respectively 32.1% and 27.2% after the implementation of WMI. 2) When supplier and retailer one implement VMI, the cost of system declines 20.7% and 17.2%. 3) When supplier and retailer two implement VWI, the cost of system declines 21.9% and 18.3%.

6. An inventory model for perishable items with two retailers

Perishable products widely occur in daily production and life, such as vegetables, fruits, meats, seafood, whose freshness level are decreasing and inventory are losing by deterioration (damage, spoilage, dryness, vaporization, etc) as time elapsing. In this paper, an inventory model with two retailers is discussed, whose demands for perishable products are respectively constant and stock-dependent. Two retailers sell the same perishable product ordered from the single wholesaler. In the model, constant deteriorating rate is considered, shortages are allowed without backlogging, the total cost (including holding, purchasing, shortage and ordering costs) is analysed, in which shortage cost rates are different for two retailers. The necessary conditions of the existence and uniqueness of the optimal solution are shown. An optimal solution procedure to find the optimal replenishment policy is presented, and convexity conditions discussed.

7. A Study on Supermarket Chains of Multi-category Inventory Management Strategy

Nowadays, the supermarket chains face the multi-category goods of which gross profit rate and sales volume are different. In this paper we study on supermarket chains of multi-category inventory management strategy. Firstly, we carry out classification on the goods by the method of retailer-oriented category roles. Then, we set different service level for different category goods. At last, we discuss the different categories of the optimal reorder point and the optimal order quantity.

8. Exact Evaluation of A Two-Level Inventory System With Information Sharing

In this paper we consider a two-level inventory system with one warehouse and one retailer with information exchange. Transportation times are constant and retailer faces independent Poisson demand. The retailer applies continuous review (R, Q)-policy. The supplier starts with m initial batches (of size Q), and places an order to an outside source immediately after the retailer's inventory position reaches R + s. The lead time of the retailer is determined not only by the constant transportation time but also by the random delay incurred due to the availability of stock at the supplier. In a recent paper the expected value of this random delay is used for evaluating the approximate cost of this inventory system, while in this paper using the idea of the one-for-one policy we implicitly incorporate the distribution function of the random delay to obtain the exact value of the expected system costs.

9. Inventory management optimization model with database synchronization through internet network

In the past (classical supply chain) the supply of goods generally flow starts from factory or producer, then producer sent to a storage area called the warehouse. When finished goods are collected, the goods from storage area or warehouse (WH) is distributed to the distribution centre (DC). Then after the goods were placed in the Distribution centre, then the goods are shipped to the retailer (retailer). The drawback of this system is when there is a shortage of goods at the retail level, it takes a long time in the distribution of goods, from warehouse into the retailer. With the approach of the Physical Internet (PI), where the objective is to combine into a unified logistics network, the system is interconnected, the inventory can be shared through hubs that serve the market and distribution of resources. In other way, the function of warehouse and distribution centre was replaced by hubs that serve to optimize transport and inventory. Although the physical internet inventory control model better than the classical model, but the model of inventory management with database synchronization better than the physical Internet. With the approach database synchronization, several hubs can be combined into one hub, and the plant can also send goods directly to the retailer. In addition to optimizing transport and inventory, this analysis allows to choose a dynamic source when an order is placed: source substitution. Although this calculation is working on a computer simulation, the main intent of this paper is to define new research model inventory controlling better than classical inventory model and physical internet inventory model, which is inventory management model in synchronized database.

10. Inventory policy based on differential pricing with stockout compensation in B2C E-commerce

Differential pricing is an effective tool for electronic retailer to manage the inventory and mitigate customer's dissatisfaction caused by stockout. The paper analyses the effect of offering a lower price during stockout period to compensate for a customer's waiting time and simultaneously optimizes the ordering quantity of inventory, the length of out-of-stock period and the prices offered during the in-stock and stockout periods, using the similar analysis framework with Bhargava and Sun's model. However, our model is different from the Bhargava and Sun's model in two ways. Firstly, the order quantity of inventory replaces the duration of in-stock as decision variable because using a random variable as decision objective is not appropriate. Secondly, a customer's valuing of the item during out-of-stock period should be different from that in in-stock period due to customer's reactions to the stockout. The paper analyses the characteristics of optimal inventory, pricing and stockout period. The optimal stockout-compensation policy is to make the two periods have equal effective prices. We introduce the concept of acceptance rate thetas, explores its effect on inventory and pricing policy. The firm obtains maximum profits only when the customer's valuation for the product in the stockout period is the same as that in the in-stock period. We analyse the behaviours of rational customer and find that the rational consumers never defer their purchase whether they arrive in the in-stock period or not. Thus, the optimal inventory and pricing policy is unchanged for the rational customers. The paper points out existence conditions of the unique optimal solution, especially gives the optimal inventory and pricing policy when G(U) is a uniform distribution.