Inventory Management of Perishable Goods with Overconfident Retailers

Authors: Mingyang Zhang ,,Xufeng Yang ,Taichiu Edwin Cheng andChen Chang

Year: 2022

Abstract:

In recent years, many retailers sell their products through not only offline but also online platforms. The sales of perishable goods on e-commerce platforms recorded phenomenal growth in 2020. However, some retailers are overconfident and order more products than the optimal ordering quantity, resulting in great losses due to product decay. In this paper, we apply the newsvendor model to analyze the impacts of overconfident behavior on the retailer's optimal pricing and order quantity decisions and profit. Our model provides the overconfident retailer with a feasible and effective method to adjust optimal ordering and pricing decisions. Through numerical studies, we examine the retailer's optimal decisions under the scenarios of complete rationality, over-estimation, and over-precision. We find that the over-estimation retailer always orders more products than the optimal order quantity, and the over-precision retailer always orders fewer products than the optimal order quantity. Under some conditions, overconfidence hurts the retailer's revenue to a large extent. Therefore, it is beneficial for the overconfident retailer to adjust its order quantity according to our research findings.

Supply Chain Contract Preferences Under Two Uncertain Selling Seasons Considering Intertemporal Inventory Capability

Author: Jianhu Cai, Yujie Zhang, Qing Zhou, Tingting Xue, Zhijun Zeng

Year: 2021

Abstract:

We propose an intertemporal inventory decision model under demand uncertainty and retail competition. Facing the fact that different firms may have different intertemporal inventory capabilities, the paper introduces two retailers and assumes only one retailer has the ability to carry intertemporal inventories. Two different contracts, i.e., the dynamic wholesale-price contract and the commitment wholesale-price contract are proposed. The optimal decisions are derived under each contract, and all members' preferences regarding the two contracts are investigated. The results show that there exist some situations in which the supply chain members prefer the same contract, and they can reach an agreement on the contract selection. We also find that the intertemporal inventory discriminately affects the supply chain members' expected profits under two different contracts. The retailer's intertemporal inventory capability may be beneficial for all members under the dynamic wholesale-price contract, but it always damages the supplier's expected profit under the commitment wholesale-price contract.

Integrated Inventory-Transportation Problem in Vendor-Managed Inventory System

Authors: Lan Teng; Zhenji Zhang; Pu Li; Daqing Gong

Year: 2019

Abstract:

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. The objective of the problem is to minimize total logistics cost in the distribution network, including inventory cost, distribution cost, and time penalty cost. The upper echelon model focuses on minimizing inventory cost while the lower echelon model on vehicle routing problem. 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. Computational experiments are executed to compare the performance of independent and integrated inventory-transportation optimization from the dimension of to verify the effectiveness of the model and the algorithms.

Inventory management for retail companies: A literature review and current trends

Authors: Cinthya Vanessa Muñoz Macas; Jorge Andrés Espinoza Aguirre; Rodrigo Arcentales-Carrión; Mario Peña

Year: 2021

Abstract:

In recent years, the correct management of inventories has become a fundamental pillar for achieving success in enterprises. Unfortunately, studies suggesting the investment and adoption of advanced inventory management and control systems are not easy to find. In this context, this article aims to analyze and present an extensive literature concerning inventory management, containing multiple definitions and fundamental concepts for the retail sector. A systematic literature review was carried out to determine the main trends and indicators of inventory management in Small and Medium-sized Enterprises (SMEs). This research covers five years, between 2015 and 2019, focusing specifically on the retail sector. The primary outcomes of this study are the leading inventory management systems and models, the Key Performance Indicators (KPIs) for their correct management, and the benefits and challenges for choosing or adopting an efficient inventory control and management system. Findings indicate that SMEs do not invest resources in sophisticated systems; instead, a simple Enterprise Resource Planning (ERP) system or even programs such as Excel or manual inventories are mainly used.

Forecasting intermittent demand for inventory management by retailers: A new approach

Authors: Xin Tian, Haoqing Wang, Erjiang

Year: 2021

Abstract:

The forecasting of intermittent demand is a complex task owing to demand fluctuations and interval uncertainty. Intermittent demand is essentially random demand with a high percentage of zero values. In the retail industry, there are many products which face intermittent demand and this poses a problem of inventory management. This study proposes a Markov-combined method (MCM) for forecasting intermittent demand, which takes into account the inventory status and historical sales of products. We divide the prediction process into two stages. In the first stage, the transition probabilities of the four basic states of demand and inventory are calculated. In the second stage, the corresponding and appropriate prediction method is selected according to the predicted state. Further, using two large datasets from the two biggest e-commerce companies in China, we verify our results and show that the MCM forecasts more accurately than the Single Exponential Smoothing (SES), Syntetos-Boylan Approximation (SBA), and Croston (CR) methods. The MCM can be as an alternative method for forecasting intermittent demand because it is easy to compute and typically more accurate than the classical forecasting methods.

Base-stock distributed inventory management in continuous-review logistic systems — Control system perspective.

Authors: Przemysław Ignaciuk

Year: 2017

Abstract:

In the paper, the dynamics of goods distribution systems managed according to the continuous-review base-stock inventory policy are investigated. As opposed to the previous studies, which limit the scope to the fundamental serial and treelike settings, a multi-echelon mesh topology of interconnected actors (suppliers, distribution center, retailers) is considered. The exogenous, uncertain demand may be imposed on any node in the controlled system, not just conveniently selected end points. The stock replenishment orders are realized with nonnegligible delay. A state-space model to study the properties of base-stock policy is proposed. The choice of control system parameters for obtaining a high service level with reduced holding costs is discussed. The analytical findings are supported by numerical tests.

IoT-Assisted Low-Cost and Scalable Inventory-Management System

Authors: Chandra Shekhar; Rishikesh Vepura; Sudipta Saha

Year: 2021

Abstract:

Management of inventory is an extremely important issue in our day-to-day life. Starting from the kitchen, workshop, to retail stores everywhere, it is very essential to keep enough stock of each of the required items. However, manual management of the inventory often fails to maintain an up-to-date status of the stock of all the items all the time. Existing solutions based on RFID tags, weight-sensors-based automated measurements, etc. are not scalable. A solution for smart-inventory management should support a plug-and-play installation and operation which is largely missing in the existing solutions too. Finally, appropriate coordination with the host systems such as smart-home or smart-retail management, etc. is also an important need which the existing solutions fail to achieve efficiently. In this work we propose the design of iLid, an IoT-assisted smart-inventory management system, to satisfy all these above mentioned needs in a cost-effective way. We take the help of low-power IoT-devices equipped with low-resolution cameras to realize an automated scalable and cost-effective inventory management system. Automated measurement of the quantity of each individual item in the inventory as well as efficient collection of the measurement data are two fundamental components in iLid. In this paper, through extensive evaluation study we demonstrate that iLid can carry out quantity measurement efficiently with an average accuracy of 98%. Through simulation we also show that the data collection module of iLid is highly energy and time efficient as well as scalable.

A Case Study of Inventory Management System for an International Lifestyle Product Retailer in Bolivia.

Authors: Boris Herbas Torrico, Sebastián Alem Oyola.

Year: 2021

Abstract:

Effective inventory management influences every aspect of a firm's operations. Inventory management in developing countries is a difficult business process because firms do not use basic inventory control concepts and techniques. Moreover, developing countries are characterized by trade imbalances with developed countries due to process inefficiencies, bureaucracy, and communication problems. This leads to longer lead times and supply uncertainty. Consequently, firms attempt to overcome the supply uncertainty by carrying unnecessary amounts of buffer stocks. We analyzed the inventory management system of an international lifestyle product retailer in Bolivia and found that, as the literature predicted, the firm showed no use of basic inventory control techniques. Particularly, it did not make data-driven decisions, lacked an effective inventory management system, or knew which products had higher consumer demand, and thus worked under a high level of supply uncertainty and inventory management illiteracy. Therefore, to reduce supply uncertainty, we developed a new inventory management system based on two strategies: (a) strategies to reduce demand uncertainty; and (b) strategies to reduce process uncertainty. Specifically, we implemented triple exponential smoothing for product demand forecasting, ABC segmentation to identify the most important products in the firm's portfolio, the newsvendor model to determine optimal inventory levels, powers-of-two policies, to optimize reorder times, and Turnover Based Metrics to arrange SKUs in the warehouse. Overall, our results suggest the significance of taking into account the country in which any firm operates. Hence, it should not be a surprise that in developing countries firms show high buffer stocks and generally adopt reactive flexibility practices.

Inventory management efficiency analysis: A case study of an SME company

Authors: S S Islam, A H Pulungan and A Rochim

Year: 2019

Abstract:

The research aims to examine factors that affect inventory mismanagement in a Small Medium Enterprises (SME), which is a market leader in the Heavy Equipment Spare part Industry. Despite its status as market leader, the company deals with various inventory problems, for examples slow-moving stocks, delivery delays to customers, and so forth. Those problems, at the end, may reduce company's profit. In order to determine the main factors, this study applies quantitative and qualitative methods. Quantitative methods, specifically Pareto diagram and Inventory Turnover Ratio (ITR), are mainly used to evaluate sales and inventory management. ITR is affected by spare part quantity, warehouse area used, and the material amount. The top five ITR ratings are examined further through observation, interview, and questionnaire techniques. Meanwhile, the qualitative method is applied to evaluate the company's inventory information systems, procedures and coordinations among departments, and human resources. Our findings suggest that the unintegrated company's information system and lack of qualified human resources are the main factors affect inefficient inventory management. The research benefits to industry by suggesting the importance of information systems and human resources to inventory management. As for academics, this research enriches inventory management literature.

Inventory management practices among Malaysian micro retailing enterprises

Authors: Kamilah Ahmad, Shafie Mohamed Zabri

Year: 2016

Abstract:

Inventory management represents a key success factor that shows how efficient a company is controlling its inventories. However, there is little information on inventory management practice in a small business setting. Therefore, this study examines the current state of inventory management practices and factors that influence their use in micro retailing enterprises. A questionnaire survey was employed to gather data from the targeted respondents. Using 100 completed replies, the results demonstrate that most responding enterprises have adopted both unsystematic and systematic inventory management approaches in their business. A fully systematic approach of inventory management was only utilized by 33 per cent of the total respondents. In terms of inventory management techniques used, 'the rule of thumb' is the most popular among respondents. Meanwhile, EOQ, Bar Code Tagging and VMI are only applied by a small number of respondents. The results also indicate that Purchasing and Controlling are the most frequent inventory management activities applied by micro enterprises as opposed to Storage and Tracing. Finally, the results suggest that owner/managers' attitude and knowledge in inventory management have significant and positive influences on inventory management practices. On the other hand, the cost factor has a significant and negative influence on inventory management practices. Thus, all three proposed hypotheses developed in this study are supported.