Inventory Management Literature Review: Based on Perishables, Channel Supply, Supply Chain Cooperation

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Abstract: Inventory management is an important problem in the enterprise, inventory is a double-edged sword, if used well, it will be the key to gain profits, if there is a problem, it will also become the last straw that breaks the camel. The inventory problem will be the key to the survival of enterprises. This paper mainly studies the literature of inventory management in the past 5 years, and expounds the inventory problems that researchers pay attention to from the issues of perishable goods and multi-channel supply. The conclusion of this paper has a positive impact on the future supply chain inventory cooperation of enterprises.

Keywords: Inventory Management; Perishables; Channel Supply; Supply Chain Cooperation.

1. Introduction

How to place a large amount of purchased goods? This is the initial problem with the introduction of the concept of inventory. Inventory is indispensable in the whole supply chain, whether it is the upstream of the supply chain - manufacturers, or the downstream of the supply chain - suppliers, retailers will have their own inventory. In the traditional mode, inventory management refers to the business management of the import, export and storage of materials, and each node enterprise manages its own inventory independently. Each node seeks to reduce inventory, reduce stock shortage and reduce the risk of uncertain demand from the perspective of maximizing the enterprise's own interests. Maintaining a certain amount of own inventory can reduce risks such as stock shortage and demand uncertainty, and reduce dependence on external traders to a certain extent. Although traditional inventory can reduce the risk of stock shortage, in the whole supply chain, it will lead to problems such as inventory cost increase, bullwhip effect, upstream and downstream enterprise interest confrontation, cooperation and communication difficulties. How to solve these problems can reduce the cost of inventory management, and can increase their profits will be the future inventory management needs to solve the problem.

With the emergence of the concept of supply chain, enterprises have formed upstream and downstream network structures involving the activities of providing products or services to end users. Cooperation between enterprises can greatly reduce the inventory of their own enterprises. In order to solve these problems, more inventory management models have emerged, such as supplier inventory management (VMI), joint inventory management (JMI) and collaborative Supply chain inventory management (CPFR). Although these inventory management models can solve the problems brought by the traditional model, they still cannot completely solve other problems, and there are still other problems to be solved in different industries or in the face of different types of goods.

At present, many literatures have put forward a lot of studies in order to solve these still existing problems. These studies can be applied to various models of various industries, and some outstanding problems in this industry model can be well solved. These are great progress.

2. Problems of Literature Research

In recent years, in the study of inventory, different researchers have different directions of inventory research. Because of its different characteristics from other products, perishable products must be sold within a specific time to ensure that the quality of products can be guaranteed, and the interests of enterprises and consumers can be protected from loss. Therefore, for this kind of products, the inventory management problem is particularly prominent. In order to maximize their own benefits and reduce the inventory overhang that may result from perishable product characteristics, enterprises need to carefully develop effective inventory management strategies. Qingguo Bo et al. [1] studied the problem of joint inventory and pricing strategy of retailers with multiple distribution channels selling perishable goods under e-commerce environment. Monireh Ahmadimanesh, Tavakoli Ahmad [2] et al studied how to design an optimal inventory management model for blood transfusion networks, thereby reducing costs. It can be seen that both domestic and foreign countries agree that the inventory management of perishable products is an extremely critical issue.

With the development of internet technology, more and more people are enthusiastic about online shopping. Most people believe that online prices are cheap and offer a wide range of styles with great options. However, there are still many people who think that online shopping is too illusory, the pictures are not consistent with the real thing, there are great deceiving, and the waiting time for logistics and distribution is very long, so they are more willing to go to the offline store to buy visible good quality goods to hand. The emergence of online sales channels also means that there are now more channels to buy products, and people have more and more choices. Therefore, in order to improve the competitiveness of goods, attract more customers, increase the selectivity of goods, and create more sales opportunities for goods, many businesses choose to implement dual-channel sales strategy. At this time, the inventory will include offline inventory and online inventory, and the inventory management method will undergo some changes. Yajie Ji et al. [3] studied the impact of consumers' online reference effect,
offline inventory effect and channel preference on the operational strategies of supply chain members in the context of supplier managed inventory. Yu Cao et al. [4] established a dual-channel supply chain model consisting of a manufacturer and a retailer, and studied the effects of "free-riding" behavior and inter-channel out-of-stock substitution behavior on inventory competition and promotion decisions in the supply chain under random demand. Bo Qingguo et al. [1] also studied a multi-channel commodity pricing model. It can be seen that consumers' channel choice has a very important impact on the inventory shortage problem and the operation problem of the enterprise. In the inventory of enterprises, there can be multi-channel inventory at the same time, as long as the appropriate regulation can reduce the stock shortage problem.

The concept of consumers often changes, and their demand is uncertain, but this uncertain demand can effectively stimulate the inventory of enterprises. Therefore, it is crucial for businesses to accurately predict consumer demand. The ability to predict consumer demand in advance not only helps to better control inventory, but can even move toward achieving the goal of "zero inventory." This will significantly reduce inventory management costs and make more money available for new product development or talent discovery, which will significantly increase overall profits. To successfully predict consumer demand, companies need to share customer confidence both upstream and downstream of the supply chain. This sharing can effectively solve the adverse impact of "bullwhip effect" on enterprise inventory. Through the establishment of a good information sharing mechanism, enterprises can more accurately capture market changes, understand the product heat, so as to adjust the production and inventory strategy, ensure that products meet the market demand in time, and avoid the problem of excess or insufficient inventory to the greatest extent. Hongyan Dai et al. [5] et al. designed a benefit coordination mechanism considering real-time inventory information in the context of inaccurate inventory, so as to maximize the overall benefits of the supply chain. Chia-Hung Chuang and Yabing Zhao [6] studied the inventory management of demand-stimulated finished products and the impact of inventory policy on automotive supply chain management. Rahaman Mostafijur, Mondal Sankar Prasad et al. [7] studied the collaborative research on inventory management under uncertain environment based on memory and learning effects. However, the uncertainty of inventory is not only limited to the consumer level, but also involves the management level. Managers face multiple challenges, including market volatility, supply chain instability, and changes in the external environment. These factors make effective inventory management more complex and challenging. Managers need to continuously optimize inventory strategies and adopt advanced technologies and tools to monitor market trends in order to respond more flexibly to uncertainty and ensure inventory levels can meet market demand while minimizing costs. In this dynamic and uncertain business environment, managers also need to establish strong communication channels and maintain close ties with partners up and down the supply chain. This collaboration allows for a more transparent flow of information and the sharing of key data, leading to more accurate insights into market changes and product needs. By working together with all parties, managers can better understand the uncertainty in inventory and develop more flexible and adaptable inventory management strategies to better adapt to changes in the market and the changing business environment.

With the deepening of research, scholars continue to put forward more inventory management methods to cope with various challenges in different situations. They innovate and integrate on the basis of existing inventory management methods, resulting in a richer inventory solution to adapt to different business needs and changing market conditions. This constant effort to innovate gives businesses more flexibility and enables them to deal more effectively with the complexity and uncertainty in inventory management. By learning from and integrating different management methods, enterprises can develop more targeted inventory strategies, improve the efficiency of inventory management, ensure the timeliness of product supply and reduce potential cost risks. Ying Feng et al. [8] studied the supply chain composed of suppliers, third-party logistics service providers and retailers, and explored the impact of the introduction of two inventory management modes, vendor managed inventory and consignment inventory, on system operation and contract design, considering the situation that the supply and demand parties jointly outsource logistics services to third-party logistics service providers and share freight costs. Based on previous literature studies, Xuefei Shi et al. [9] found that there is no literature on the selection and purchasing decision of multiple products under the constraints of inventory capacity and minimum order quantity. Therefore, the model of product selection and purchase quantity decision under the constraints of inventory capacity and minimum order quantity is constructed. In order to help retailers improve their profits, a joint purchasing model under the condition of stock sharing is established. Liu Yang, Haitao Li [10] et al developed a strategic inventory management decision tool, which integrates inventory classification and inventory control policy decisions to maximize order fulfillment performance, while considering constraints on inventory budget and company profit expectations.

In addition to these issues, the scholars also discussed issues such as inventory control. Inventory warehouse space is certain, the number of goods is unlimited, want to play the inventory to its due value must be a good choice of inventory goods, and how to effectively control, strive to achieve the maximum utility. Qingzhong Ren et al. [11] made a comparative study on the classical stochastic production inventory model based on stochastic dynamic optimization theory and ADRC, in order to maximize profits.

In recent years, scholars have deeply studied the root causes of inventory problems from many angles and put forward corresponding solutions. However, with the constant changes in consumer demand and the constant fluctuations in the market environment, inventory management faces ongoing challenges. These problems will always exist, and we need to continue to discover and study in order to find more effective solutions. In order to meet the ever-changing market demand, scholars have conducted extensive research in the field of inventory management and put forward innovative solutions. However, as markets change, the nature of the inventory problem is evolving. Therefore, we need to continue to pay attention to changes in consumer demand, flexibly adjust inventory management strategies, and find more adaptable solutions through continuous research. In this evolving business environment, inventory issues will continue to be a core issue that needs to be addressed and addressed. The research of scholars provides us with a rich
reserve of knowledge, but at the same time, it also reminds us to stay alert and respond to new challenges at any time. Through continuous academic research and the accumulation of practical experience, we can better understand and respond to the problems in inventory management, ensuring that enterprises maintain flexible and sustainable operations in the face of uncertainty.

3. Research Methods Used in the Literature

The research of inventory problems, more emphasis on practical application, need to introduce a variety of variables to deeply explore their impact on inventory management. Therefore, many researchers tend to build models to solve various problems in reality. These models cover factors ranging from market demand and supply chain stability to changes in the external environment to more fully analyze the complexity of inventory management.

By building models, researchers can simulate inventory operations under different scenarios and conduct systematic empirical analysis. This approach not only helps to understand the nature of the inventory problem, but also provides specific guidance and optimization recommendations for enterprises. In the modern business environment, such a model is not only a tool for academic research, but also a powerful support for practical business decisions, helping managers better respond to dynamic changes in the market, optimize inventory management strategies, and improve overall operational efficiency. For the inventory problem of perishable products, Qiu Guo Bo et al. [1] established an optimization model, and then verified whether the theoretical results were reasonable and could be applied to practice through empirical analysis. Monireh Ahmadimanesh, Tavakoli Ahmad et al. [2] designed optimal management models for transfusion networks by combining reusable simulation techniques (applicable to all bases) and deep neural networks in the blood supply chain with multiple recursive layers (the latest neural network technology), thereby reducing costs. It can reduce blood waste, backflow and shortage. They set up supply networks in terms of technology and simulate the application to their satisfaction.

In the dual-channel, multi-channel or omni-channel operation mode, the inventory problem mainly involves the game between channels, in which there are complex game problems. In this situation, both sides of the channel need to achieve a win-win situation through the best game strategy to ensure that both sides can get the maximum profit. This will become the core issue that needs to be studied and discussed in depth. In dual-channel or multi-channel environments, competition and cooperation between channels are particularly important. In order to cooperate effectively and reduce inventory risk to the greatest extent, both sides of the channel need to discuss and formulate game strategies together. Through in-depth study of various game models and practical experience, it can provide the basis for both parties to make wise decisions in the complex and changeable market, and achieve the best effect of inventory collaborative management. In the omni-channel operation mode, more parties are involved, and the complexity of game problems is further increased. In addition to the two sides of the channel, it is also necessary to consider the interests of manufacturers, suppliers and other parties. In this case, to study and discuss how to optimize the game strategy of all parties and realize omni-channel collaborative inventory management will be an important topic worthy of in-depth study.

By deepening the understanding and application of game problems, all parties can better cooperate, effectively solve the challenges in inventory management, and realize the optimization and collaborative development of the overall supply chain. This kind of research is not only conducive to the advancement of theory, but also can provide practical and feasible collaborative management schemes for enterprises in the complex and changeable market environment, and promote the sustainable development of channel operation mode. Yajie Ji et al. [3] made use of differential game theory and continuous dynamic programming theory, compared static analysis and contrastive analysis at the same time, and finally made numerical examples to get conclusions. Yu Cao et al. [4] established a dual-channel supply chain model consisting of a manufacturer and a retailer, and proved the existence and unique Nash equilibrium results of pure strategy of channel competition by numerical simulation, and analyzed the effects of retailer's promotion effort level, degree of "free hitchhiking" behavior and out-of-stock substitution rate on retailer's optimal order quantity and manufacturer's optimal inventory. On the premise that the potential market size of traditional retail channels and network channels is uniformly distributed, the optimal promotion effort level of retailers under decentralized decision-making is obtained, and the influence of the degree of "free rider" behavior on the optimal order volume of retailers and the optimal inventory of manufacturers is analyzed. All these methods are based on numerical simulation and have verified whether the constructed game theory is suitable.

In the case of uncertainty, researchers often use testing algorithms to verify their models. Hongyan Dai et al. [5] further used the Shapley value method to distribute the increased benefits of the supply chain according to the premium capacity of all parties to ensure the fairness and effectiveness of the coordination mechanism. At the same time, it intends to establish a quantitative model to fill the research gap and better solve the problem of inventory inaccuracy, and it is expected that the research results can help the collaborative innovation application of RFID in the supply chain. Chia-Hung Chuang, Yabing Zhao et al. [6] used data from General Motors dealers to propose two simultaneous equation modeling (SEM) systems to examine the interaction and simultaneous effects of dealers' sales demand, order quantity, and inventory levels. Rahaman Mustafijur, Mondal Sankar Prasad et al. [7] extended the Economic Order Quantity (EOQ) model to memory - and learning-sensitive Settings. The main structure of the model is based on the assumption that the demand of the EOQ model is constant during the inventory run, and that the shortage period is also a decreasing function of time. Fractional calculus is introduced as an alternative to integers, and the concept of memory is included in the proposed theory. Finally, using the extension principle of Zadeh, the fuzzification of the fractional deterministic model is performed, and finally the learning-based decision awareness is incorporated, so that the requirements become triangular dense fuzzy numbers. All these methods are intended to prove the validity and positivity of the models they design.

Xuefei Shi et al. [9] established a joint decision model of product selection and procurement under the constraints of minimum order quantity and inventory capacity based on the economic batch order model, and designed a corresponding
polynomial-time algorithm to solve it. In order to further improve the profit of retailers, a joint purchasing decision-making model of inventory sharing is set up. Based on the cooperative game theory, the corresponding profit distribution scheme is designed. Ying Feng et al. [8] built a sequential non-cooperative game model in which the third-party logistics service provider dominates and the supplier and retailer follow, proving that the equilibrium order volume/consignment volume exists and is unique under all modes, and discussed the changes of the equilibrium result with the retailer's freight allocation ratio and transfer payment price. Liu Yang, Haitao Li et al. [10] build a model that allows enterprises to evaluate whether the current inventory performance is Pareto optimal, quantify the trade-offs among various performance measurement indicators, and determine the correct inventory level according to the strategic goals of enterprises. These methods are also on the basis of predecessors, continue to build models in line with their own arguments, and carry out calculations.

The inventory problem is usually solved by building a model or introducing various variables that may affect the inventory change based on the existing model. The researchers then used specific computational methods to analyze the models and reach their final conclusions. This approach aims to gain a deep understanding of the complexity of inventory management and provide viable solutions for practical applications. Through model construction and variable introduction, researchers can simulate inventory operation under different scenarios, so as to comprehensively analyze factors such as supply chain, market demand and external environment, and provide more guiding and optimized suggestions for enterprises. This empirical analysis method is essential for inventory management in the modern business environment, which can help managers better adapt to market changes, optimize inventory strategies, and improve overall operational efficiency.

4. Research Results Obtained from Literature

Whether it is Chinese literature or foreign literature, the ultimate goal of studying inventory management is to minimize the cost of enterprises and obtain the maximum profit. This involves the comprehensive consideration and coordination of supply chain, production process, market demand and other aspects. Through effective inventory management strategies, enterprises can respond to market fluctuations more flexibly, reduce inventory holding costs, improve capital turnover efficiency, and ultimately maximize economic benefits. This goal is a common goal pursued by companies around the world, laying the foundation for competitiveness and sustainable operations.

In terms of perishable products, Qingguo Bo et al. [1] compared the theoretical results with the actual ordering situation, and concluded that the optimal strategy of theoretical analysis was basically in line with the practical operation. Through the sensitivity analysis of parameters, the corresponding inventory management conclusions are summarized. The theoretical results are verified and the influence of the change of relevant parameters on the optimal inventory strategy and selling price is further obtained. Monireh Ahmadimahesh, Tavakoli Ahmad et al. [2] used the model, and its final solution helped to better predict the hospital demand, the optimal safety reserve of the base, the optimal number of hospital orders and the optimal number of inpatient deliveries. This forecast helps significantly reduce the number of blood units returned to base, increase the availability of inventory, and reduce costs.

In terms of multi-channel inventory, Yajie Ji et al. [3] found through comparative static analysis and contrastive analysis that the inventory effect has a positive impact on production volume and a negative impact on product quality, big data marketing services and offline services. Consumers' online preferences under different conditions have different impacts on corporate decision-making. Supplier service cost sharing contract can motivate retailers to improve offline product services and improve the performance of independent operation of enterprises to a certain extent. In order to further coordinate the distributed supply chain, the contract of supplier revenue sharing and bilateral cost sharing is designed on the basis of the above contract. Numerical examples show that the new contract can realize the perfect coordination of distributed supply chain under certain conditions; Consumers' excessive reliance on brand goodwill for reference quality is easy to produce "anchoring psychology", which will not only inhibit members' enthusiasm for production and service, but also cause inventory overhang, hinder the accumulation of brand goodwill, damage corporate profits, and not conducive to consumers' better shopping experience. Yu Cao et al. [4] found through comparison that under different degrees of "free-rider" behavior, traditional retail channel substitution rate and network channel substitution rate, the expected return of the supply chain under centralized decision-making is greater than the expected total return of the supply chain under decentralized decision-making.

In terms of uncertainty, Hongyan Dai et al. [5] found that the visibility benefits brought by the downstream acquisition of RFID (providing real-time information to make the supply chain transparent) will increase the upstream inventory cost, while the preventive benefits (combining with other technologies to reduce inventory inaccuracy) will reduce the upstream procurement cost. Under certain conditions, when the downstream gives up the visibility benefits of RFID and only obtains preventive benefits, the benefits of the overall chain can be maximized. This paper aims to analyze the impact of real-time information obtained by RFID on supply chain cost and synergy, so as to better solve the problem of inventory inaccuracy and guide the collaborative innovation of RFID in the supply chain. The empirical results of Chia-Hung Chuang, Yabing Zhao et al. [6] show that under dynamic and uncertain environment, high demand leads to high inventory level (sales effect), and high inventory level stimulates sales demand (demand stimulus effect). The researchers also found that inventories cannot stimulate demand indefinitely. This is the first empirical study that applies SEM system to inventory management of finished goods in automotive supply chain. And the methods and results of the researchers provide several ways to formulate the policy of manufactured goods inventory in enterprise management. Rahaman Mostafijur, Mondal Sankar Prasad et al. [7] concluded that the combined influence of learning and memory has a positive effect on the cost reduction goal of the proposed batch adjustment problem.

The numerical test of Xuefei Shi et al. [9] shows that the fewer the product types, the larger the inventory capacity, the more members of the alliance, and the more profits increased by joint purchasing. Joint purchasing can increase the total profit of the cooperative alliance by up to 26%. Ying Feng et
In the future, inventory management is still a challenge that every manufacturing enterprise must face. The current popular concept of "zero inventory". The meaning of zero inventory is a state in which the storage quantity of some or some kinds of items in the form of warehouse storage is very low, or even "zero", that is, no inventory is maintained. However, for most businesses, achieving zero inventory is not an easy task. In order to make better use of inventory resources, enterprises can integrate all links of the supply chain, share information, and realize collaborative inventory management, so as to improve the flexibility of inventory. However, this kind of cooperation is also accompanied by the problem of power and responsibility distribution, which becomes a complex and long-term game process. In all links of the supply chain, all parties pursue their own profit maximization and do not want to bear losses. Therefore, the cooperative management of inventory involves the attribution of rights and responsibilities. Through discussion and negotiation, we can find a right and responsibility allocation scheme that satisfies all parties in the context of cooperative inventory management, and avoid conflicts and contradictions caused by inventory cooperation. This highlights that inventory management is not only a matter of quantity and process, but also involves complex rights negotiations between organizations. Inventory management is also closely related to demand forecasting and contract issues. The accuracy of forecasting market demand and the clarity of contract terms will directly affect the rationality and effectiveness of inventory. Therefore, future research directions may include how to use advanced technologies to improve the prediction accuracy of market demand, and how to design supply chain contracts that are more flexible to adapt to market changes. Taking these aspects into consideration, future inventory management research will need to dig into the details related to cooperation, responsibility allocation, demand forecasting and contract design, so as to promote enterprises to achieve greater economic benefits and competitive advantages in the competitive market.

The issue of perishables is actually a time-sensitive one. If perishables can be delivered to consumers in a timely manner before they deteriorate, it will not be a problem. The relationship with inventory is also a time issue, including the purchase method, time, quantity and storage period are the challenges faced by perishables. In terms of multi-channel issues, with the development of technology, people have gained more convenience. However, is there only competition between channels? Actually, it's not. Although there is a problem of inventory competition, inventory cooperation is the solution. For demand forecasting and economic order size judgment, researchers have cited a variety of models in the literature for research, which is also a problem that we can explore in depth. Inventory exists in the supply chain, so inventory problems can also be reflected as supply chain problems. Supply chain is a complete chain, each link has its own role, but such a cycle is boring. Only through mutual cooperation and information sharing can all aspects achieve mutual benefit and win-win results.

Inventory management is still a problem waiting for people to solve, only in finding and solving problems can we really get the future direction conducive to the development of enterprises.

5. Future Research Direction of Inventory Management

Through the in-depth study of the literature related to inventory management in recent years, it is expected that the future research direction of inventory management will be diverse and extensive. The demand for inventory in different industries makes the research focus different in different backgrounds and fields. However, the core issue that these studies focus on is how to reduce inventory cost, reduce waste, optimize inventory control and improve inventory utilization under different scenarios. Future research trends are likely to revolve around how to predict market demand more accurately, adopt advanced technologies to improve the efficiency of inventory management, and build more flexible supply chain systems. This comprehensive focus indicates that inventory management is an important topic that will continue to drive higher levels of economic efficiency and sustainable operations in different areas.

al. [8] found that the equilibrium order quantity under the retailer managed inventory mode is always lower than that under the retailer managed consignment inventory mode and centralized decision making, while the order quantity under other inventory management modes is not necessarily lower than that under centralized decision making. Under different inventory management modes, the relationship between order volume/consignment volume and the total expected returns of the supply chain under the equilibrium state depends on the marginal (gross profit) contribution rate of suppliers and retailers, which indicates that under the supply chain environment, the income structure and profit level of upstream and downstream member enterprises have an important impact on inventory decision-making and the selection of inventory mode. Liu Yang, Haitao Li et al. [10] showed in the calculation results the tradeoff and positive correlation between inventory performance indicators based on key items and orders and short-term profitability under different inventory budget levels in the multi-item finished product inventory system. Qingzhong Ren et al. [11] found that when the demand function is constant, the production strategy given by ADRC has a probability of nearly 45% lower total cost than the production strategy solved by stochastic dynamic optimization theory. When the demand function contains unknown seasonal periodic changes, the analytic solution of the optimal production strategy cannot be obtained by using stochastic optimal control theory, but ADRC can still eliminate the impact of uncertain environment and obtain satisfactory production strategy through real-time feedback.

Different researchers conduct research in their own unique contexts, so their focus may be different, however, the common core goal is to focus on reducing costs and increasing profitability. This reflects their common concern for inventory management, that is, through fine-tuning the supply chain, optimizing the production process, meeting market demand and other aspects of efforts to achieve the ultimate goal of reducing business operating costs and improving profitability. This common focus is diverse across different research backgrounds and subject areas, but all demonstrate a common pursuit of maximizing economic benefits. This trend shows that around the world, researchers share a similar vision in the field of inventory management to drive long-term competitiveness and sustainable operations.
References


