



Research on the Optimization of Inventory Management at Yonghui Supermarket

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Abstract. In China, many retail chains continue to rely on traditional, unsystematic business strategies, leaving them ill-equipped to address issues such as excess inventory, declining revenue, and customer attrition. To meet these challenges, retail chains must transform their business strategies to align with the demands of the new retail era. This paper first identifies issues in Yonghui Supermarket's inventory management, such as insufficient collaboration with suppliers, excessive safety stock for certain products, and an unattractive product mix, and provides an in-depth analysis of the underlying causes. Regarding optimization strategies, specific measures are proposed, including strengthening cooperation with suppliers, improving the accuracy of demand forecasting and upgrading inventory control, as well as optimizing the product mix and procurement strategies. This study provides valuable insights and guidance for optimizing Yonghui Supermarket's inventory management. By implementing these optimization strategies, Yonghui Supermarket is expected to improve its inventory management practices, enhance operational efficiency, and achieve sustainable development. It also offers valuable insights and lessons for other retail enterprises seeking to improve their inventory management.

Keywords: Retail Industry, Inventory Management, Inventory Control

1 Introduction

Inventory management is a critical component of business operations, and its efficiency directly impacts a company's cost control, cash flow, and market competitiveness. In the retail industry in particular, inventory management is a key factor that can determine a company's survival. As a well-known domestic retail enterprise, Yonghui Supermarket has secured a strong market position through its extensive product range, high-quality shopping environment, and excellent reputation for service. However, with intensifying market competition and diversifying consumer demands, Yonghui Supermarket has begun to reveal certain shortcomings in its inventory management. Therefore, this paper selects Yonghui Supermarket as the subject of study, conducts an in-depth analysis of the current state and existing issues in its inventory management, and proposes corresponding optimization strategies.

Through an in-depth study of inventory management, this paper aims to help Yonghui Supermarket improve capital utilization efficiency and reduce the risk of inventory buildup, thereby achieving effective management of capital turnover. Furthermore, optimizing inventory management will enable Yonghui Supermarket to better respond to changes in market demand, enhance product timeliness and availability, and consequently improve customer satisfaction and strengthen brand competitiveness. Furthermore, optimizing inventory management helps reduce operational costs, improve supply chain efficiency, and foster collaboration and coordination between the company and its suppliers, thereby building a more stable and efficient supply chain system.

The innovation of this paper lies primarily in its application to the practical context of inventory management in retail enterprises. Using Yonghui Supermarket as a case study, it reveals the current status and issues of its inventory management through in-depth analysis and research. This paper employs not only the case study method but also integrates various research methods, such as data analysis, to ensure a comprehensive and in-depth analysis. Addressing the issues in Yonghui Supermarket's inventory management, this paper proposes a series of practical optimization strategies. These strategies are tailored to Yonghui Supermarket's specific circumstances yet possess a degree of universality, offering practical guidance and insights for other retail enterprises.

2 Literature Review

Munyaka et al. found, through an analysis of inventory management practices, that demand is a key variable in inventory control systems, and its characteristics influence inventory handling methods. Important characteristics of demand include its level of certainty—which can be classified as deterministic (i.e., fully known) or stochastic/Bayesian (i.e., known but uncertain)—as well as its structural dependence (i.e., independent or correlated)^[1]. Through empirical research, Shao demonstrated that MOE-PPO consistently outperforms traditional heuristic methods and standard PPO, significantly improving inventory management performance^[2]. To address gaps in the existing literature, Shivam et al. proposed a mixed-integer programming model that integrates the CLS and SCND problems, fully accounting for practical factors such as multi-period dynamics, multi-level structures, sustainability impacts, risk mitigation, and inventory management^[3]. Jingbi et al. deepened the understanding of productivity by examining the nonlinear impact of lean inventory composition on productivity and analyzing how market concentration and product competitiveness moderate the relationship between lean inventory composition and productivity^[4]. Research using numerical experiments and real-world case studies has demonstrated that this system exhibits good effectiveness and scalability in complex logistics environments, providing new theoretical methods and practical pathways for intelligent inventory management^[5]. Arvia et al. systematically and critically synthesized the application methods and practical suitability of statistical methods, artificial intelligence methods, and hybrid methods in manufacturing inventory management^[6].

3 Problems in Yonghui Supermarket's Inventory Management and Analysis of Their Causes

3.1 Lack of Close Cooperation with Suppliers

Yonghui Supermarket implements a competitive bidding strategy in its supplier selection process, aiming to maintain a proactive position in procurement. However, during negotiations, Yonghui Supermarket places too much emphasis on price comparisons and price-cutting, tending to select the lowest-priced supplier. This procurement model is typically viewed as a “one-time” transaction that ends once the deal is closed. However, the limitation of this model lies in the lack of after-sales service guarantees. When quality issues arise with products, Yonghui Supermarket must bear the costs of returns, exchanges, or losses on its own. Although the bidding strategy can reduce procurement costs in the short term, this price-based approach to supplier selection may lead to problems such as declining product quality and delivery delays, which in turn can damage the store's brand image and result in customer attrition. In recent years, Yonghui Supermarket has raised its supplier admission standards, using contract terms to restrict payment conditions and extend payment terms, thereby tying up suppliers' working capital. While this practice aids Yonghui's financial operations in the short term, it may lead to strained relationships with suppliers and increased uncertainty in cooperation over the long term. Furthermore, suppliers are required to bear high entry fees and various promotional costs, which further compresses their profit margins, posing a challenge to the establishment of long-term, stable partnerships. Regarding information sharing, Yonghui Supermarket has not yet established an effective information-sharing platform with its suppliers, resulting in a lack of transparent and efficient communication between the two parties regarding customer demand, inventory levels, delivery deadlines, and transportation arrangements.

The reason for the lack of close cooperation with suppliers may lie in the absence of effective communication and information-sharing mechanisms between the two parties. There may be barriers to information exchange between Yonghui Supermarkets and its suppliers regarding orders, inventory, and sales, making it difficult for the supermarket to promptly understand key information such as suppliers' production capacity and delivery lead times, and thus preventing it from making accurate procurement decisions. At the same time, suppliers may be unable to produce on demand due to a lack of real-time sales data from the supermarket, further exacerbating inventory management issues.

3.2 There is an Excess of Safety Stock for Some Products

Yonghui Supermarket's excessively high safety stock levels have led to severe inventory backlogs, significantly driving up warehousing costs and resulting in a waste of resources. Data from December 2022 shows that the average inventory volume across its stores reached 10.6079 million units, with 11% of individual SKUs sitting in inventory for over 18 months, highlighting a particularly acute problem of excess inventory. Among these, frozen and refrigerated goods are the most typical example of inventory

backlog. These products require special storage conditions, not only occupying a large amount of warehouse space but also generating high operating and maintenance costs for refrigeration equipment. Store surveys revealed that the procurement volume of frozen and refrigerated goods far exceeds sales volume. Warehouses are overflowing with goods, disorganized, and in some cases, merchandise is even piled up outside the warehouse. This situation not only increases the workload for staff restocking and reduces operational efficiency but also forces the supermarket to encroach on internal warehouse aisles to install additional freezer units. Furthermore, there have been instances of frozen goods being mistakenly placed in refrigerated storage, significantly increasing the risk of product spoilage and wastage. Inventory turnover data further highlights the flaws in the company's inventory management. In 2022, Yonghui Supermarket's inventory turnover days stood at approximately 52.88, with goods remaining in stock for an average of over two months, and the inventory turnover rate was significantly lower than that of industry peers. The company's traditional management model of relying on high inventory levels to mitigate the risk of stockouts is outdated and inefficient, and it is one of the core causes of the inventory issues. At the same time, the supermarket's three major departments—Purchasing, Sales, and Warehousing—operate in silos, lacking a mechanism for coordination and communication: the Purchasing Department independently handles product sourcing and restocking; the Sales Department only submits basic sales reports without promptly updating market demand trends; and the Warehousing Department is solely responsible for basic inventory management processes, unable to effectively supervise or coordinate the purchasing and sales operations. Yet market demand is dynamic, and imbalances between supply and demand directly lead to the dual problems of stockouts resulting in lost customers or inventory buildup resulting in losses.

Overall, Yonghui Supermarket's excess safety stock stems primarily from three issues: first, insufficient accuracy in market demand forecasting, which fails to adapt to dynamic market changes; second, procurement plans lacking scientific rigor and rationality, resulting in purchase volumes that deviate from actual sales needs; and third, outdated inventory control methods, with delayed inventory updates and distorted data, which further exacerbate the problem of inventory buildup. In response, Yonghui Supermarket urgently needs to overhaul its traditional inventory management mindset, strengthen interdepartmental coordination, and precisely align with market demand in order to improve inventory turnover efficiency and reduce inventory costs.

3.3 The Product Mix Lacks Appeal

First, a significant challenge facing Yonghui Supermarkets is the outdated nature of its product portfolio. Analysis shows that over 10% of its inventory consists of out-of-season and slow-moving items. This situation arises primarily because management has not paid sufficient attention to product updates and replacements, resulting in many items on the shelves featuring traditional and outdated designs that are readily available on the market. Furthermore, due to the seasonal nature and short shelf life of fresh produce, it is difficult for consumers to gauge demand trends, making fresh produce a key focus of sales competition. In terms of pricing strategy, Yonghui Supermarket has not

demonstrated a significant low-price advantage, which further reduces the appeal of its products. Additionally, deficiencies in ABC analysis are a major cause of inefficient product placement. Some low-margin, slow-moving items occupy prime shelf space, while products that have already been phased out by the market remain on the shelves. This not only affects the customer shopping experience but also reduces overall sales. Particularly on shelves for fast-moving consumer goods and promotional items, availability rates fall below 95%, further weakening the supermarket's competitiveness. In summary, Yonghui Supermarket needs to strengthen its management focus on phasing out outdated products and introducing new ones. By continuously updating its product mix, optimizing shelf displays, and enhancing price competitiveness, the company can overcome the current issue of an outdated product structure.

The issue of an unattractive product mix stems primarily from a lack of understanding of market demand and delays in updating the product lineup. Yonghui Supermarkets may have failed to promptly identify changes in consumer demand, resulting in a product mix that is out of step with market needs. At the same time, the introduction of new products and the phasing out of old ones may not have kept pace with market trends, leaving the product mix lacking in novelty and appeal.

4 Strategies for Optimizing Inventory Management at Yonghui Supermarkets

4.1 Strengthen Cooperation with Suppliers

By establishing close, mutually trusting partnerships with suppliers, Yonghui Supermarkets can significantly improve the efficiency and effectiveness of its inventory management.

First, strengthening cooperation facilitates information sharing. By establishing an information-sharing system with suppliers, Yonghui Supermarkets can access real-time product information, inventory status, and market trends, enabling it to more accurately gauge market demand and inventory levels. At the same time, suppliers can use this system to view Yonghui Supermarkets' sales data and inventory status, providing strong support for both parties in jointly developing procurement plans and inventory strategies.

Second, strengthened cooperation helps optimize procurement strategies. Through in-depth communication with suppliers, Yonghui Supermarkets can gain a better understanding of information such as suppliers' production capacity, product quality, and delivery lead times, thereby formulating more scientific and reasonable procurement plans. At the same time, both parties can explore opportunities for long-term collaboration, such as signing long-term supply contracts or establishing strategic partnerships, to stabilize the supply chain, reduce costs, and improve overall operational efficiency.

4.2 Improving Demand Forecasting and Enhancing Inventory Control

First, improving the accuracy of demand forecasting is crucial for inventory management. Yonghui Supermarket should leverage advanced data analysis tools and technologies to build precise demand forecasting models by integrating historical sales data, market trends, and consumer behavior insights. At the same time, it should strengthen communication and collaboration with the marketing department to promptly obtain market updates and promotional activity information, thereby enabling more accurate predictions of future demand. By improving the accuracy of demand forecasting, Yonghui Supermarket can plan its procurement more effectively, avoiding both excess inventory and stockouts.

Second, upgrading inventory control methods is also a key measure for optimizing inventory management. Yonghui Supermarket should implement an advanced inventory management system to enable real-time updates and sharing of inventory information. Through systematic management, the company can monitor inventory levels, sales velocity, and order status in real time, promptly identify inventory anomalies, and take appropriate corrective actions. Additionally, Yonghui Supermarket can adopt advanced technologies such as the Internet of Things (IoT) and RFID to enable automatic identification and tracking of inventory, thereby enhancing the efficiency and accuracy of inventory management.

4.3 Optimize Product Mix and Procurement Strategies

First, optimizing the product mix helps enhance the appeal of inventory and improve market competitiveness. Yonghui Supermarket should conduct regular, comprehensive analyses of its existing product mix. By taking market trends and consumer demand into account, the company should phase out slow-moving items while actively introducing new products that meet market needs. Through continuous optimization of the product mix, the company can ensure that inventory aligns with market demand and enhance the consumer shopping experience.

Second, optimizing procurement strategies is a critical component of ensuring smooth inventory management. Yonghui Supermarket should establish a scientific process for developing procurement plans, fully considering factors such as sales forecasts, inventory levels, and supplier capacity to ensure that procurement volumes align with market demand. At the same time, the company should strengthen communication and collaboration with suppliers to build long-term, stable partnerships, thereby ensuring the stability of supply and the reliability of product quality. Additionally, by introducing a competitive mechanism to compare and select among multiple suppliers, the company can reduce procurement costs and improve procurement efficiency.

5 Conclusions and Implications

This paper conducts an in-depth study of inventory management at Yonghui Supermarkets. Through a detailed analysis of the existing issues in the company's inventory management and their underlying causes, it proposes corresponding optimization strategies.

The study found that the primary challenges Yonghui Supermarkets faces in inventory management include insufficient collaboration with suppliers, excessive safety stock levels for certain products, and an unattractive product mix. These issues not only increase inventory costs but also undermine the company's profitability and market competitiveness. To address these issues, this paper proposes the following optimization strategies: First, strengthen cooperation with suppliers by establishing long-term, stable strategic partnerships to ensure the stability and quality of the supply chain. Second, improve the accuracy of demand forecasting and upgrade inventory control methods by utilizing advanced information technology and management tools to achieve refined inventory management. Finally, optimize the product mix by adjusting the variety and quantity of products based on market demand and consumer preferences to enhance product appeal and competitiveness. By implementing these optimization strategies, Yonghui Supermarket is expected to significantly reduce inventory costs, improve inventory turnover rates and capital utilization efficiency, and thereby enhance the company's profitability and market competitiveness. In the future, Yonghui Supermarket should continue to strengthen inventory management optimization efforts, continuously improving inventory management standards and efficiency to address market competition and changes in consumer demand. At the same time, these strategies provide valuable insights and references for other retail enterprises.

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