Whitepaper

Reimagining Inventory Management in Retail and CPG with AI

Executive Summary

Inventory inefficiencies can dissatisfy customers, erode profitability, and impact revenue. This whitepaper explores how AI is transforming inventory management across retail and CPG—from accurate demand forecasting and intelligent replenishment to warehouse optimization. By adopting AI-driven tools, retailers and CRG businesses can reduce inventory costs, increase inventory visibility, and maintain optimal inventory levels to meet customer demand.

Introduction

Effective inventory management is essential for driving sales, reducing costs, and minimizing waste. Yet, in an increasingly omnichannel environment, the inventory problem continues to cost the industry billions of dollars in lost revenue annually. Inaccurate demand forecasting can impact inventory levels, resulting in either out-of-stock or overstock scenarios. Out-of-stock not only results in missed sales but also dissatisfied customers who may turn to competitors to meet their needs. On the other hand, overstock conditions increase inventory costs and wastage.

Further, limited unified visibility of inventory across the supply chain affects data-driven decision making with inventory replenishment and allocation across DCs, stores, and online operations. This inventory problem is exacerbated during scenarios such as new seasons and new product launches, as well as before promotional activities. Finally, the manual orchestration of orders across the supply chain adds another layer of complexity, resulting in slower order processing, delayed deliveries, and lower overall service levels.

Gen AI and Agentic AI can enable retailers and CPG businesses to address these core traditional challenges with inventory management effectively. Agentic reimagination of inventory management enhances forecast accuracy, improves visibility, enables responsive replenishment and allocation, and ensures seamless warehouse operation.

Agentic AI in Demand Forecasting

Inaccurate demand predictions can affect inventory levels, leading to either surpluses or shortages. Excessive inventory affects working capital, increases storage costs, and risks items becoming obsolete or expired. Conversely, a lower forecast can result in understocking, which may lead to lost sales.

Beyond traditional AI, which has been used in demand forecasting for a long time, GenAI and agentic AI allow demand forecasting with higher accuracy and adapt the forecast in real-time by monitoring inventory levels and demand patterns. This helps proactively identify problems, such as when product demand is declining or when demand spikes unexpectedly. The intelligent demand forecasting leverages large volumes of structured and unstructured data from various internal and external sources. These data include historical sales, market trends, economic and geopolitical conditions, customer preferences and sentiments, clickstream data, weather data, seasonality, competitor actions, inventory levels, and supply chain disruptions Gen AI, can help better forecast high-demand items for specific periods, such as back-to-school, Halloween, and Christmas, by learning seasonal demand patterns.

Agentic AI-led solution can leverage both dynamic and preconfigured demand influencers for adaptive demand forecasting. It can also orchestrate the selection of the right forecasting models relevant to scenarios such as new product launches, promotional demand elasticity, pre- and in-season forecasts, and category-specific models.

Agentic AI in Allocation and Replenishment

Accurate allocation and timely replenishment are critical to maintaining stock availability across retail locations. It involves distributing products from a central warehouse to retail stores based on sales data, current stock, store size, seasonal demand, and promotions. This ensures that popular items are always available, preventing lost sales due to stockouts, and helps maintain optimal inventory levels, thereby reducing carrying costs and excess stock.

Agentic AI allows seamless orchestration and management of the allocation and replenishment process. Agentic AI can track merchandise plans, demand forecasts for new and regular products, store and category sales targets, inventory levels in warehouses and stores, and the service level performance of suppliers. Based on this intelligence, it can decide and manage inventory allocation at the start of the season, as well as identify optimal ordering quantities and replenishment frequencies across the retail estate, through the season, and autonomously place orders with suppliers, ensuring timely and more profitable inventory management. It also supports category managers and inventory planners with what-if simulations of various inventory scenarios as part of decision support. This capability helps in efficient and optimal inventory management.

AI in Warehouse Space Management and Tracking

Efficient warehouse operations are crucial to meeting customer expectations and maintaining cost control. Poorly designed layouts, misplaced inventory, and manual tracking can slow down fulfillment, increase operational expenses, cause order fulfillment errors and delays, shrinkage, and damages.

A digital twin of the warehouse, combined with Agentic AI, can simulate and optimize warehouse layouts based on volume, demand patterns, seasonality, product types, and order flows. It helps optimize the layout and processing of both fast and slow movers, continuously adapting to operational data and evolving demand patterns. Agentic AI's autonomous monitoring, reasoning, and adaptive approach enable unified visibility into inventory and warehouse operations with minimal human intervention. Furthermore, combined with RFID and AI-led computer vision analytics, this allows automated monitoring and auditing of warehouse inbound and outbound operations, facilitating effective and agile inventory management.

Conclusion :

Smarter inventory management is non-negotiable. Ineffective inventory management impacts retailers and CPG businesses in terms of revenue, profitability, customer experience, and brand reputation. Agentic reimagination of inventory management enables an adaptive and more accurate demand forecast, a responsive and intelligent replenishment and allocation process, unified and real-time visibility, and efficient warehouse operation. An Agentic-enabled inventory management empowers retail and CPG businesses to balance the dualities of business demands, such as sales, profitability, and customer experience, within a sustainable model.

About the Author

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Nilendu Banerjee is a consultant with over 10 years of experience in Tech Mahindra's Retail CPG practice. He has worked with leading retail and CPG brands to enhance ecommerce operations and optimize digital marketing performance. He is passionate about leveraging AI to unlock value in digital marketing and retail media network. He is an MBA in Marketing with specialization in digital marketing and advertising.

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