

Chapter 10


Enhancing Inventory Control and Reducing Holding Costs Using Generative AI

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ABSTRACT

The role of generative AI in enhancing inventory control and reducing holding costs in supply chain management. Traditional inventory management methods often struggle to balance stock levels, leading to overstocking or understocking, which incurs additional costs. Generative AI, through advanced predictive models, allows businesses to simulate various demand scenarios, improving forecasting accuracy and optimizing stock levels. By incorporating real-time data and automating decision-making, generative AI helps reduce overstocking, minimizes holding

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costs, and improves operational efficiency. This paper discusses key applications of generative AI, including demand forecasting, stock optimization, and automated reordering processes, while also addressing challenges such as data quality and system integration. The successful implementation of AI in inventory control provides companies with a competitive edge in an increasingly complex and dynamic supply chain landscape

INTRODUCTION

Inventory control and the reduction of holding costs are pivotal aspects of supply chain management that significantly impact a company's operational efficiency and profitability. Effective inventory management ensures that a business maintains optimal stock levels to meet demand without incurring unnecessary costs. Generative AI, an advanced subset of artificial intelligence that focuses on generating data and creating models, offers new avenues for enhancing inventory control by improving demand forecasting, automating decision-making, and optimizing supply chains. The traditional challenges of inventory management have long plagued businesses across industries. Companies must carefully balance the risk of stockouts against the costs of excess inventory, while considering factors such as seasonal demand fluctuations, lead times, and storage capacity. The holding costs associated with inventory, including warehouse space, insurance, depreciation, and opportunity costs, can represent a significant portion of operational expenses. In some industries, these costs can amount to 20-30% of the inventory value annually (Christopher, 2016).

Generative AI is revolutionizing this landscape by introducing sophisticated predictive capabilities and automation tools. Unlike traditional forecasting methods that rely primarily on historical data and simple statistical models, generative AI can process vast amounts of diverse data sources to create more accurate and nuanced predictions. These systems can identify complex patterns and relationships that human analysts might miss, leading to more precise inventory management decisions. According to Brynjolfsson and McAfee (2014), AI systems are capable of learning from data and continuously improving their accuracy, making them increasingly reliable in dynamic environments such as inventory control.

One of the key advantages of generative AI in inventory control is its ability to create synthetic data scenarios. This capability allows businesses to simulate various supply chain conditions and test different inventory strategies without real-world risks. For example, a retailer can generate multiple demand scenarios based on factors such as weather patterns, economic indicators, and social media trends, then optimize their inventory levels accordingly. This approach is particularly valuable for new product launches or entering new markets where historical data may be limited.

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