



Lowe's Supply chains reimagined



Lowe's Innovation Labs explored how Artificial Intelligence and a quantum-inspired optimization proof of value could smooth inventory flows, reduce bottlenecks, and improve efficiency across its logistics network.

Challenge

Managing inventory across a large network of distribution and cross-dock centers, with thousands of SKUs and changing demand, created unpredictable operational peaks that were hard to manage at scale.

Solution

Fujitsu delivered an AI-driven optimization proof of concept combining machine learning and advanced optimization to balance inventory flows and resource use.

Outcomes

- 30% reduction in peak inventory arrivals and 10% efficiency gains from proof of concept testing
- Better product availability on shelves, fewer out-of-stock situations, and more reliable delivery times for customers

"In supply chain operations, even small improvements have huge impact. Seeing a 10% efficiency gain was incredibly exciting - it showed us the potential of applying advanced optimization at scale."

Mason Sheffield, Senior Director of Innovation, Lowe's Innovation Labs



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Smoothing inventory flows across a complex retail network

As one of the largest home improvement retailers in the world, Lowe's operates over 1,750 stores supported by a vast supply chain network spanning distribution centers, cross-dock terminals, and bulk handling locations. Managing tens of thousands of SKUs - from small fasteners to large appliances and building materials - creates inherent complexity, with inventory constantly flowing from suppliers through distribution centers to store shelves and ultimately to customers.

"One of the biggest challenges we face is simply the scale," explains Mason Sheffield, Senior Director of Innovation at Lowe's Innovation Labs. "We have inventory moving through dozens of different types of facilities, thousands of trucks on the road every day, and millions of individual items that all need to arrive at the right place, at the right time."

A key issue was the volatility of inbound inventory. Peaks in arrivals could overwhelm distribution centers, stretching labor and equipment capacity, while lulls could leave teams underutilized. Although Lowe's generated enormous volumes of operational data, traditional tools struggled to turn that data into timely insights that could support day-to-day decision-making.

"We have all this data already," Mason continues. "The challenge was being able to process it fast enough to actually make decisions that matter, decisions about staffing, scheduling, and how inventory moves through our network."

From data to decisions with AI-driven insights

To address these challenges, Lowe's Innovation Labs partnered with Fujitsu to explore whether advanced optimization and emerging computing technologies could help smooth these peaks and valleys, improving efficiency without compromising product availability or customer experience.

Fujitsu worked closely with Lowe's Innovation Labs to design an AI-driven optimization and simulation proof of concept. Rather than approaching the initiative as a purely technical experiment, the teams focused on a specific business challenge: smoothing inventory arrivals across selected parts of the supply chain to reduce congestion and improve resource utilization.

The solution combined traditional machine learning and data science techniques with quantum-inspired optimization using Fujitsu's Digital Annealer. This hybrid approach allowed Lowe's to analyze vast datasets and evaluate millions of potential scenarios, something that would have been impractical with conventional computing approaches.

"What stood out to us was Fujitsu's ability to work across the full spectrum," says Mason Sheffield. "They didn't just focus on one emerging technology. They helped us prepare the data, apply traditional AI methods, and then layer in quantum-inspired optimization to get insights we could actually act on."

Industry:

Retail

Location:

USA

Website:

lowesinnovationlabs.com

About the customer

Lowe's is one of the world's largest home improvement retailers, operating over 1,750 stores and serving millions of customers across the United States. Lowe's Innovation Labs is the company's applied research and development group, piloting emerging technologies to solve real-world challenges across stores, the supply chain, and the home. Supported by a vast and complex logistics network, Lowe's moves millions of products each week, ensuring customers find the right products on time.

Driving real gains in supply chain performance

By modeling subtle changes, such as slightly advancing or delaying orders, or rebalancing inbound shipments, the solution identified ways to smooth inventory peaks without disrupting downstream availability. This enabled better alignment between inventory flow, labor capacity, and equipment usage at distribution centers.

The results were significant. The proof-of-concept demonstrated up to a 30% reduction in peak inventory arrivals, easing congestion and reducing operational strain. Lowe's also observed approximately a 10% improvement in efficiency, driven by more balanced workflows and improved resource utilization.

"Seeing a potential change of that magnitude is exciting," Mason notes. "In supply chain operations, even small percentage improvements can have a huge impact. This showed us there's real opportunity to do things differently."

These operational improvements translate directly to customer experience. Streamlined inventory flows mean better product availability on shelves, fewer out-of-stock situations, and more reliable delivery times for homeowners and professionals who depend on Lowe's for their projects.

Beyond the immediate metrics, the collaboration reinforced the value of a partnership-led approach. Fujitsu worked hand-in-hand with Lowe's teams to understand operational realities and ensure insights translated into practical outcomes. The success of the pilot now serves as a foundation for future exploration and potential production deployment.

As Lowe's continues its broader supply chain transformation, AI-driven optimization and advanced computing are expected to play an increasingly important role, helping the company build a more resilient, efficient, and customer-centric supply chain for the future.

Customer:



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