Retail Rewired:

5 Ways Retailers Can Supercharge ROI with Quantum Optimization

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Quantum computing still conjures images of lab coats and decades-away potential—but for a growing number of retailers, it's already a potentially game-changing reality.

From workforce scheduling to last-mile delivery and inventory planning, quantum optimization is helping retailers solve high-stakes problems that traditional systems increasingly struggle to solve quickly and effectively.

We'll examine five high-impact retail applications where decision-making complexities can overwhelm traditional computing and where quantum optimization can deliver tangible results. These aren't academic thought experiments—they're practical applications that can generate measurable gains for retailers today.

As your business contends with volatile consumer demand, cost pressures, and increasingly tangled logistics, quantum optimization might be your fastest path to stronger margins, smarter decisions, and that long-sought competitive edge.

Nearly half of surveyed retail, e-commerce and logistics companies are exploring quantum applications now, with 25% reporting pilots underway.

The Quantum Promise for Retailers

Retailers are constantly optimizing business processes, often starting with workflow automation. But in today's increasingly complex environment, traditional methods invariably hit walls: long run times, high infrastructure costs for large workloads, and difficulty scaling quickly to adapt to real-time needs.

Unlike traditional computers that evaluate one possibility at a time, quantum computing is designed to explore complex problem landscapes more efficiently, making it well-suited for tackling certain retail challenges that can be difficult, time-consuming, or costly for classical systems.

"The analogy I like to use is being able to try every key on a key ring at once, rather than one at a time," explains Jason Gautereaux, who spent 19 years in retail before joining D-Wave Quantum Inc. as Head of Sales for Retail & Logistics. "That's the potential, speed, and efficiency that quantum computing provides."

It's no wonder, then, that nearly half of surveyed retail, e-commerce and logistics companies are exploring quantum applications now, with 25% reporting quantum use case analysis and prioritization underway, Hyperion reports. The question isn't whether quantum optimization will transform retail—it's whether your organization will be leading that transformation or playing catch-up.

Five Use Cases to Explore Immediate Gains

From workforce scheduling that once consumed 80 hours a week, to route optimization solving months-long planning challenges in under an hour — quantum optimization is already delivering measurable gains. The following use cases highlight what's possible—and the largely untapped potential to boost revenue and operational efficiency.

01 Workforce Optimization

02 Routing & Last Mile Optimization

03 Inventory Optimization

04 Price Optimization

05 Promotion Optimization

01

WORKFORCE OPTIMIZATION

Workforce scheduling in retail is a massive puzzle, with each piece carrying multiple requirements. Retailers must align staffing with fluctuating customer demand while factoring in employee availability, preferences, skill sets, labor laws, and budget constraints—across multiple locations and shifts. Traditional approaches often result in overstaffing (bleeding money) or understaffing (bleeding customers).

Variables like shift timing, task assignments, staffing levels, and cross-training needs create a dense web of interdependencies that overwhelm even sophisticated scheduling tools.

Pattison Food Group, which operates 100+ stores across Canada, faced this exact challenge. Their manual scheduling process consumed 80 hours a week, with three to four schedulers coordinating shifts for 500+ drivers. “It was a lot of manual labor,” says Benny Wai, Manager of Analytics Development. On top of being time-consuming, the system struggled to optimize for key factors: store access per driver, required driver counts per shift, 10-hour rest rules, and balancing preferences, seniority, and operational needs.

Enter quantum optimization. Partnering with D-Wave, Pattison built an auto-scheduling application that accounted for all these variables. The result? They cut their scheduling time by 80%, from 80 hours to just 15. The team can now focus on high-value projects, only accessing legacy systems for data entry and handling last-minute changes like sick calls or staffing transitions.

Challenge

Balance staffing with demand while factoring in employee availability, skills, labor costs, and regulations across locations and shifts.

Common Constraints & Variables

- Labor budget limits
- Employee availability
- Working hour regulations
- Skill requirements
- Fluctuating consumer demand
- Shift timing/length
- Task assignments
- Staffing levels
- Overtime management
- Cross-training requirements

Quantum Advantage

- Sharp reduction in time needed for scheduling
- Improved customer and employee experiences
- Data-driven scheduling that adapts to real-time constraints

02

ROUTING & LAST MILE OPTIMIZATION

Last-mile delivery sounds simple—until real-world complexity kicks in. Vehicle capacity, traffic, customer time windows, fuel costs, driver regulations, and environmental concerns all add layers that quickly escalate with scale.

Momentum Worldwide, a division of the Interpublic Group of Companies that manages over 18,000 in-person brand events annually, encountered this challenge while planning concurrent tours across 40 stores spread hundreds of miles apart. But this wasn't just about routing. Each tour needed specific square footage, large parking lots, non-leased buildings, and other location constraints. "Part of the calculus is our ecological impact," explains Jason Snyder, Momentum's Global CTO. "We also want the best possible quality of life for our tourists and our team."

This was a more complex version of the classic "traveling salesperson" problem—finding the most efficient route through multiple stops—complicated by concurrent tours and strict constraints. Traditional systems struggled with the sheer scale: 1,838 potential itineraries across 4,567 store locations.

Normally, it would take Momentum's team months to develop a workable plan. D-Wave's quantum cloud service delivered 1,600 solutions—including 100 fully optimized routes—in under an hour.

Challenge

Minimize transportation costs and delivery times while adapting dynamically to traffic, weather, and capacity constraints.

Common Constraints & Variables

- Vehicle capacity
- Traffic conditions
- Delivery windows
- Fuel and distance limits
- Driver hour regulations
- Route sequence
- Vehicle allocation
- Driver assignments
- Delivery timing
- Load optimization

Quantum Advantage

- Reduced fuel and transportation costs
- Faster, on-time deliveries boosting customer loyalty
- Better resource utilization during peak seasons
- Ability to reoptimize, converting a static process into a dynamic one

03

INVENTORY OPTIMIZATION

Inventory management remains one of retail's biggest headaches. It's not just about avoiding stockouts—it's about hitting financial targets while optimizing inventory placement across warehouses, distribution centers, virtual hubs, and individual stores, all the way down to the SKU level, explains Gautereaux. Add in supplier lead times, storage limits, fluctuating demand, and budget constraints, and the complexity multiplies.

Traditional systems often force a tradeoff between speed and accuracy. Computational limitations mean many retailers only optimize inventory weekly, missing real-time opportunities. "If you can only optimize once a week and we reduce that effort by 80% or more, think about what's possible," Gautereaux says. "Maybe now you're optimizing daily, even multiple times a day, based on POS data, supply chain updates, cancellations, backorders—you name it."

But quantum optimization isn't just potentially faster; it can also be smarter. Imagine cutting your total inventory by 30% while generating the same revenue, Gautereaux notes: "You're optimizing faster, more frequently, and taking real cost out of the supply chain."

This shift turns inventory management from a static, periodic task into a real-time, responsive system. Retailers can maintain higher service levels with leaner inventory—improving both cash flow and customer satisfaction.

Challenge

Ensure the right products are in the right place at the right time while minimizing stockouts, overstocks, and holding costs.

Common Constraints & Variables

- Storage capacity
- Supplier lead times
- Demand variability
- Service level targets
- Budget constraints
- Reorder points
- Order quantities
- Safety stock levels
- Inventory allocation across locations
- Forecasting models

Quantum Advantage

Improved cash flow and product availability

Lower holding costs and better demand responsiveness

Reduced manual effort

04

PRICE OPTIMIZATION

Modern retail pricing spans three key areas: everyday pricing, promotions, and end-of-life markdowns. “It helps to think in terms of the pricing lifecycle,” says Gautereaux. “What’s the right price for a product—at the right time, in the right place? And how should that vary across locations?”

The challenge? Pricing strategies must account for cost of goods sold, competitor pricing, customer sensitivity, regulatory requirements, and brand standards—while managing base prices, discounts, bundles, and dynamic rules across multiple channels and regions.

As in other retail functions, traditional systems often force trade-offs. Most pricing tools on the market focus only on price and promotion, and classical solutions can constrain optimization because infrastructure costs spike with complexity.

In contrast, the upside of quantum optimization is real, Gautereaux notes: “Based on what we’ve seen in practice, quantum optimization often can speed up pricing decisions by approximately 80% and drive a 30% increase in sales revenue.”

Challenge

Maximize revenue through strategic pricing that reflects customer demand, competition, and brand value across SKUs, channels, and regions.

Common Constraints & Variables

- Cost of goods sold
- Competitor pricing
- Customer price sensitivity
- Regulatory compliance
- Brand guidelines
- Base price
- Discount levels and timing
- Bundling strategies
- Dynamic pricing rules
- Promotional pricing scenarios

Quantum Advantage

Increased sales and profitability

Stronger market positioning and customer rapport

Improved ability to clear slow-moving stock

05

PROMOTION OPTIMIZATION

Which products should you discount—when, how much, and for how long? What types of promotions drive the most sales—BOGO (buy one, get one free), loyalty rewards, or something else? Which channels or customer segments convert best?

While we covered promotional pricing earlier, the other side of promotion optimization is strategy orchestration—especially in an omnichannel environment. That means aligning campaigns across physical stores, e-commerce, apps, social media, call centers, chatbots, loyalty programs, and more—each needing tailored offers and messaging. "It's very hard to orchestrate all that," notes Gautereaux.

"The good news is, the data and channels already exist," he adds. Quantum computing can process all those inputs—offers, timing, customer behavior, and platform dynamics—to optimize how retailers engage each customer. "The Holy Grail is hyper-personalization versus generic messaging. The opportunity lies in becoming more granular."

Beyond personalizing offers for maximum conversion, quantum systems can also optimize promotional calendars—reducing cannibalization, improving inventory turnover, and aligning campaigns with bigger goals like customer acquisition and market share growth.

Challenge

Increase sales and engagement while preserving margins, avoiding over-discounting, and aligning with business goals.

Common Constraints & Variables

- Promotional budgets
- Inventory availability
- Margin thresholds
- Brand consistency
- Competitive landscape
- Promotion type
- Discount depth
- Target audiences
- Timing/duration
- Channel mix

Quantum Advantage

Higher promotional ROI and targeted personalization

Excess stock clearance without margin erosion

Long-term brand value protection

The Customer Experience Connection

At its core, quantum optimization is about delivering a better customer experience. “When retailers optimize their operations, benefits flow directly to customers in tangible ways,” says Gautereaux.

First, it enables “made-for-me” interactions—hyper-personalized messaging and experiences based on individual data, not broad customer segments. Quantum computing can be used to process complex variables to help tailor outreach and engagement at scale.

Second, it improves fulfillment. Smarter logistics and routing mean faster, error-free deliveries. Optimized supply chains can ensure the right products are in the right place at the right time—reducing frustration and driving loyalty.

There’s also a growing sustainability payoff. “Consumers increasingly care about a brand’s environmental impact, and quantum optimization can offer a more energy-efficient approach while maintaining service quality,” Gautereaux notes.

> “When retailers optimize their operations, benefits flow directly to customers in tangible ways.”

Jason Gautereaux,

Head of Sales for Retail & Logistics, D-Wave Quantum Inc.

The D-Wave Quantum Advantage

Faster time to answer

Increased flexibility and ability to act on diverse scenarios.

Higher quality answer

Improved modeled metrics.

Lower cost to answer

Greater operational efficiency with fewer resource restrictions.

Added complexity in answer

Increased applicability and improved simulation of complex scenarios.

The Quantum Opportunity Ahead

Far from a moonshot, quantum optimization is a practical method for solving retail's stubborn operational challenges—often faster and more effectively than traditional systems allow. Beyond the five use cases explored here, opportunities extend into supplier portfolio management, warehouse operations, store layout, shelf space allocation, and more. "That's just the beginning. Quantum optimization is a massive opportunity for retailers," says Gautereaux.

And critically, the ROI is fast. "Return on investment can be nearly immediate for quantum optimizations in retail," he says. "Once you run your first optimization and act on it, you can quickly see value—through faster run times, smarter resource use, and stronger business outcomes."

For those exploring where to start, look for pain points that are time-intensive, require frequent recalculation, or involve trade-offs between competing priorities. These tend to be the clearest paths to quick, meaningful wins.

The window for first-mover advantage is closing. While some retailers wait on "someday" solutions, others are already gaining ground. The choice is clear: embrace quantum optimization now—or risk falling behind as your competitors move faster, smarter, and leaner.

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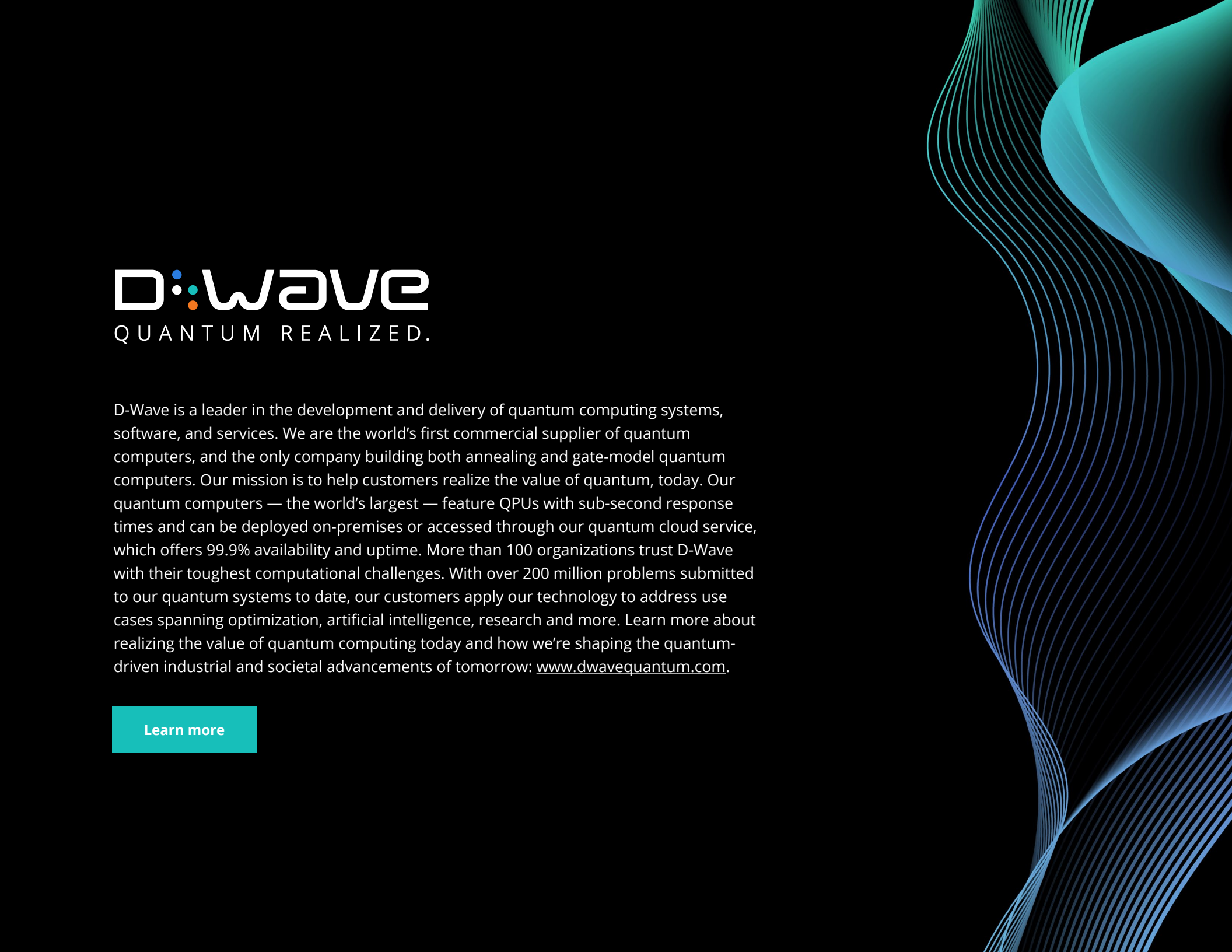

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