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SPECIAL REPORT

# HOW AI IS HELPING RETAILERS FORECAST DEMAND AND OPTIMIZE INVENTORY PLACEMENT

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## INTRODUCTION

The requirements for retail success don't get much more basic than the ability to accurately forecast customer demand. Even a mom-and-pop bodega has to have a pretty good sense of how many people will order a breakfast sandwich and coffee each day. And for larger-scale retailers, that need for an accurate forecast gets complicated, and re-complicated, by the need to correctly place and price inventory in multiple locations in order to achieve maximum sell-through with minimum discounting.

Can artificial intelligence (AI) give retailers and their supply chain partners the guidance they need to improve demand forecasts and inventory optimization? It's already doing so — and generating measurable results — in a range of use cases, but much of its potential is still unexplored.

This special report will identify AI-powered solutions' biggest benefits in the complex, interlocking area of demand forecasting and inventory optimization, including:

- The ability to gather and coordinate data, including **unstructured data**, from a wider range of sources than had been previously possible;
- Using these data insights for other types of targeting, for example better aligning advertisers' **retail media placements** with specific audience characteristics to capitalize on trends and improve ad campaigns' incremental performance;
- **Support for gaming out "what-if?" scenarios**, allowing supply chain managers to quickly pivot if there's an unexpected event like the recent collapse of Baltimore's Francis Scott Key bridge; and
- The ability to **translate trend information into action**, shortening time to market and helping retailers take advantage of opportunities in both the short and long term.





## WHY DEMAND FORECASTING REMAINS ONE OF RETAIL'S TOUGHEST CHALLENGES

It's no wonder retailers and their supply chain ecosystems are eager to leverage AI as a way to improve demand forecasting, a challenge that has bedeviled merchandisers, marketers and inventory managers for decades, if not centuries.

"Demand is typically the most important piece of input that goes into the operations of a company," said Rupal Deshmukh, a Partner in the Strategic Operations practice at **Kearney** in an interview with *Retail TouchPoints*. "Poor demand forecast accuracy equals cash out the door. For example in the chemicals industry, if you're at **40% to 50%** forecast accuracy, you're probably holding **two to three times as much inventory as your peers.**"

Inventory placement is also challenging, even when a retailer's overall demand forecast is optimal. Retailers are well aware that having too much inventory in the wrong store, or not enough in the right one, affects not just sell-through but labor costs and store operations. These mismatches also create the need for either markdowns or additional shipping costs to get the products to where they are more likely to be sold.

Compared to demand forecasting, "inventory is more of a math problem that's tough to get right," said Deshmukh. "The equation is simple: there's this much variability in demand, this is how much safety stock you'll need — but the inputs going in are often wrong, and that's when you get ripple effects."

Deshmukh noted that retailers' forecast inaccuracies often stem from overreliance on their own internal data: "They often have a lot of POS data but they don't use [the data that] product companies have or even what consumers have," she said. "They don't listen to consumers or market signals; we find over and over again that they don't do this right. Companies that are doing well have **a true pulse on market signals, for example what consumers are seeing on social media**, as well as weather trends and the impact of geopolitical events."

This is an area where AI can shine, she explained. "AI allows you to evaluate unstructured data in a much more structured way. **Use of large language models (LLMs) and generative AI can help in the area of customer inputs.** A lot of companies find that their sales teams get inputs through emails and calls they receive, but they can't convert that into a data point. Gen AI could be a game-changer in this area."

AI's ability to gather and synthesize data from so many sources also makes it valuable for retailers managing another part of their inventory: **retail media ad placements.** With a better understanding of not just how many shoppers are in a store (or on a website) at a particular time but also their demographics, lifetime value and purchasing intent, retailers can both **improve the performance of advertisers' campaigns and quantify the incremental benefits.**



## HOW AI'S MACHINE LEARNING CAPABILITIES CAN IMPROVE INVENTORY OPTIMIZATION

Signs of a lack of inventory optimization are often quite apparent, according to Fabrizio Fantini, PhD, VP of Product Strategy at **ToolsGroup** and Co-author of *Analytics for Marketers: When to Rely on Algorithms and When to Trust Your Gut*. “Diagnosing an inventory problem doesn’t require a sophisticated statistical model; you’re either out of stock or you’re drowning,” said Fantini in an interview with *Retail TouchPoints*.

“Forecasting the sale of an individual product is an extremely inefficient approach,” Fantini added. “For example, if you have many SKUs, the number of sales for each individual SKU is quite small.” That means there will be many “zeroes” on daily, weekly or monthly sales reports — and “any algorithm fed with a lot of zeros will struggle” to produce an accurate forecast.

Inventory optimization challenges also are augmented by the “butterfly effect.” That’s when what looks like a minor incident in one location creates a cascade of responses and counter-responses throughout a system (like a supply chain) that balloon into a tidal-wave-sized impact.

While the butterfly effect is almost always at work in inventory optimization efforts, it’s harder to measure than the direct drags on the business from misaligned inventory, which include the need to do “unnecessary promotions affecting margins, **because eventually, everything is perishable given enough time,**” said Fantini. “There’s also the opportunity cost of carrying the inventory as well as the danger of out-of-stocks, which affects customer service and brand reputation. These are direct, measurable, observable financial outcomes.”



As bad as these are, the indirect impacts can be even more far-reaching: “The immediate problem might be there’s too much stock, so you have to discount,” said Fantini. “However, the **lack of responsiveness [in many systems] creates inefficiencies in planning, procurement, modeling, transportation and logistics** — all these inherent consequences. With a markdown you can count the dollars, but the cost of non-responsiveness is even more substantial.”

Fantini believes a paradigm shift that moves from a predictive forecasting model to a prescriptive optimization approach, aided by AI-powered decision support, can help in three key ways. The first is when an AI solution offers users a probability curve that includes a level of uncertainty for each output. In other words, an AI inventory optimization solution might recommend sending **50** SKUs of a particular item to a store because there’s a **75%** probability that they will sell through at full price. If that sounds like good odds to a merchandiser, they can approve taking such an action.

Fantini admits that this isn’t something most human managers are familiar with, even though such optimization is present in consumer-facing services such as Google Maps: “Google Maps can show you a better route, and it’s adapting as conditions change and evolve,” he said. “You may be used to those things as a consumer, but as a retail manager, you’re risk-averse, so it’s not comfortable.”

AI’s second big advantage is that, by design, it’s constantly learning as it’s used. “The system learns from what you’re doing, so in the Google Maps example, if you take a different turn and it actually works, the system will ‘learn’ that route not just for you but for anyone else using the solution,” said Fantini.

Third, AI’s scalability allows it to take both its own results and those of the humans guiding it and turn them into easily executable actions. Fantini gave the example of a pricing system, where a human has the final word but “where the system helps scale and industrialize the goodness in your own intuition, which is impossible for a human to do; it can industrialize the discoveries uncovered by these questions.”

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-Fabrizio Fantini, ToolsGroup

## CASE STUDY

## HOW AI TAKES THE 'LUMPINESS' OUT OF INVENTORY PLANNING FOR FLOOR & DÉCOR

*Floor & Décor faces a number of forecasting and inventory planning challenges because a key product it sells, flooring, is usually only purchased twice in a consumer's lifetime. "We sell [flooring] jobs, not individual pieces, so our sales are very 'lumpy' and intermittent," said Darryl Aldridge, VP of Inventory at Floor & Décor in an interview with Retail TouchPoints. "That makes it a challenge to forecast and have the right inventory in the right location, because we're not necessarily selling our best-known products every day."*

Floor & Décor also prides itself on having a large in-stock selection at its more than **225** stores. Not only does this provide a better customer experience, but because flooring is both heavy and bulky, there's a benefit to having inventory spread around as a way to minimize shipping costs.

Aldridge and his team have been using AI-powered solutions from **Manhattan** and they have already seen "much better long-range projections, and store-level forecasts that are much more accurate," he said. Additionally, the larger number of data inputs used by these solutions allows Aldridge to use them for a range of "what if?" scenarios based on the potential impact of various events.

For example, "if an area has a flood, we would expect a bump in sales afterwards," said Aldridge. "Flooring is not the first thing you would think of [after a natural disaster], but [using AI] we can dial up scenarios," that would forecast the increased demand.

On the supply chain side, AI allows Aldridge to more easily factor in the effects of weather-related disruptions, geopolitical activities (the war in Ukraine, for example) or accidents such as the Francis Scott Key bridge collapse in March 2024. "We can get answers about these within a day versus a week or more, which allows us to do a lot more 'what if' scenarios," said Aldridge. For example, "if we see an uptick in fuel prices, that will affect our trucking costs, so we can see if it makes sense to buy products from somewhere different."





## **JUST SCRATCHING THE SURFACE OF AI'S POTENTIAL**

Many of AI's enhancements to demand forecasting and inventory optimization already are being recognized, but industry experts agree that there's still plenty of white space for additional benefits. However, tapping these benefits will require more than just technological advances; user mindsets also need to change.

"We're still missing people who have the vision to understand what is possible [with AI], and the ability to connect that vision to the people who can ask the right questions," said Fantini. "The number-one piece of feedback we get is that before working with these [AI tools], we didn't even know what was possible. Well, **now that you know it is possible, you need to acquire the capability to systematically get these [tools] and embed them into day-to-day operations.**"

When this happens, it opens up opportunities for a highly integrated set of systems that are focused on the customer. "Ultimately, any kind of data is about the customer, directly or indirectly," said Fantini. "When you suddenly have the ability to cost-effectively and systematically infuse data into your decisions, your ability to create an outcome [you want] will be much more integrated. **Supply chain decisions will be integrated with pricing and marketing decisions as well as financial and budgeting decisions; it becomes part of a continuum.**"

Retailers need to build on the "pockets of goodness that AI is creating across a large number of businesses," said Deshmukh. "We've seen AI applications for demand sensing drive tremendous value; telecom and home goods retailers using external market signals to augment forecast accuracy has led to improvements by as much as **10 to 20** percentage points. Additionally, companies that have started using AI in their procurement and supply spaces, to test categories or quantify massive amounts of spend data, are doing that faster and with higher accuracy."

Fantini sees AI's effects in this area becoming even more widespread as the tech advances. "These AI models are unlocking supply chains' capabilities for doing good, and everybody is a winner," he said. "The consumer gets better service at potentially lower costs, the company gets more efficiency and profit. They reduce waste, improve environmental issues and boost economic performance by making the market work better.

**"The supply chain is something you only know exists when it doesn't work, but [it can fail] in many different ways,"** Fantini added. "However, if you're making it more efficient, everyone wins."

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[info@retailtouchpoints.com](mailto:info@retailtouchpoints.com)



### ABOUT THE AUTHOR

Adam Blair, Editor

Avid theater-goer, intrepid journalist and grammar nag. There's always something new to learn about retail technology.