# 5 ways data science and AI are shaping the future of grocery shopping

# INTRODUCTION

The grocery shopping experience continues to evolve, with data science a key driver in enabling innovation in today's data-driven world. At 84.51°, data science is central to our work in helping The Kroger Co., CPGs, agencies, publishers and other stakeholders create more personalized and valuable experiences for shoppers across the path to purchase.

Here are five ways we foresee data science and emerging technologies taking the shopper experience to the next level — making it even more efficient, personalized and seamless for both shoppers and associates.

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# #1

# Advanced personalization with AI

For CPGs and retailers alike, data science has revolutionized the ability to personalize the path to purchase. Advanced applications of machine learning and AI are set to enhance and scale personalization in concert with the additional insights provided by smart carts, touchscreens and other data sources.

In the near future, expect more AI-powered personalized services to be available to shoppers such as:

**Customized shopping lists and meal plans –** Imagine a digital assistant powered by generative – or gen – AI, designed to revolutionize the way consumers plan meals and shop for groceries. By simply telling the app what ingredients shoppers have at hand, such as chicken, tomatoes, spinach and pasta, it instantly crafts a customized and personalized recipe tailored to their provided dietary preferences and past purchases.

The app can generate a shopping list for any missing ingredients, ensuring they align with the provided dietary needs, preferred brands and taste preferences. For added convenience, it can provide options like auto-delivery of groceries right to the shopper's doorstep or optimized store maps for a seamless in-store shopping experience.

This AI assistant will become more than just a tool but a personal culinary advisor and shopping guide, making meal planning and grocery shopping a breeze and suited to different lifestyles.

**Enhanced personalization at scale –** Gen AI coupled with advanced machine learning will transform the way marketers tailor their communications, making them more relevant and personalized than ever. With the power to automate data analysis and the creation of personalized content, marketers can produce tailored messages, advertisements and videos at an unprecedented scale and speed.

Additionally, emerging technology enables dynamic adjusting to messaging and content in real-time — maximizing relevancy for the customer. Gen AI's ability to automate and rapidly scale data analytics as well as generate content means marketers will be able to create personalized messages, ad designs, videos and more on a local store level, unlocking time to focus on strategic initiatives, all while delivering more personalized and pertinent messages.

## TAKEAWAY:

Greater personalization capabilities represent an enormous opportunity to better meet shopper preferences and demands. However, it also means having to rethink research and development pipelines, marketing strategies and even packaging to align with a more personalized future. As AI regulations evolve, companies must also ensure that they make the necessary adjustments to remain in compliance.


# #2

# Seamless in-store shopping technologies

Today's grocery shoppers expect a seamless path to purchase with personalized recommendations and incentives no matter how they shop. CPGs who craft cohesive channel connections by integrating shopper insights and digital platforms into products, packaging and retail environments will lead category growth.

Examples of how shopping technologies and data insights play a role in enabling seamless experiences include:

**Bridging the gap between online research and store shelves –** Two-dimensional (2D) barcodes like QR codes as well as near field communication (NFC) and radio frequency identification (RFID) can bridge the gap between online product research and in-store shelf selection.

When shoppers are in the store, they can scan a package code with an app that launches more details about the product, such as sustainability commitments, recipes incorporating the product, coupons or trial incentives.

For example, by scanning a QR code, a customer can access a gen AI app paired with augmented reality that would display an interactive overlay right on their screen. This overlay would show detailed comparisons of nutrients, ingredients and pricing, and even offer personalized recommendations, all superimposed over the real-world product image they are viewing.

The connectivity of scannable packaging enables shoppers to re-engage the brand story first discovered online while physically browsing the aisle. And, if self-checkout is enabled through the phone, shopping cart or another device, transition from product discovery to purchase.

**More efficient and educational shopping cart trips –** Smart carts, shopping carts equipped with sensors, touchscreens and mobile point-of-sale systems, have arrived. Expect more to be rolled out, along with features and capabilities that enable a seamless shopping experience.

Smart carts, for instance, are an underutilized platform for brands to communicate with and educate shoppers. Smart carts and other mobile devices can also leverage electronic display maps and positional tracking to offer turn-by-turn directions that route customers to items on their list.

**Uncovering patterns in shopper behavior –** Advanced analytics enabled by QR codes, RFID tags, smart carts and other shopping technologies could uncover valuable shopper insights. At an aggregate level, RFID tags and smart carts can show when shoppers interact with a product, helping CPG brands to understand how frequently customers consider items and/or abandon them, as well as uncover broad basket patterns and traffic flows.

## TAKEAWAY:

The connectivity provided by scannable technology, sensor systems and more unlock transformative data (as permitted by applicable law) that enable seamless shopping experiences and position CPG brands closer to the pivotal moments.

### WHEN ASKED TO SUGGEST AN IDEA CONSUMERS WISHED EXISTED WHEN SHOPPING IN-STORE, THE MOST COMMON SUGGESTIONS WERE:

- Scan and go solutions
- App developments
- Further personalization of in-store experience

Source: 84.51° Unmet Needs Discovery Survey, March 2023

# #3 Agile shopper insights

The shift toward a seamless path to purchase across stores and ecommerce is transforming the strategies of CPG brands. In addition to scaling personalized recipes and content as described above, data science combined with advancements in AI can help CPG marketers be more agile in meeting consumer demand in several ways:

**Faster understanding and response to customer feedback –** Gen AI solutions can rapidly scan, interpret and summarize large amounts of text/feedback in near real time, allowing CPGs to gauge customer sentiment and inform decisions. Its natural language capabilities can categorize key themes in frustration sources, from site errors to packaging and more, providing clear recommendations.

**Forecasting demand –** Analyzing past order volumes by product line correlated with marketing calendar events, seasonal effects and other factors enables more accurate demand forecasts and inventory planning for items. Gen AI can accelerate this process by running millions of simulations to predict the best approach given specified targets such as market share or revenue growth.

**Uncovering complementary product opportunities –** Market basket analysis reveals what grocery products tend to be purchased together.

These association rules can help brands optimize product bundle offers or personalize cross-sell recommendations to lift basket value.

This data can be used to help brands anticipate what products customers are likely to need or want next and proactively suggest complementary products dynamically. AI goes beyond traditional market basket analysis by making each customer experience personalized to what matters most to them; suggestions are tailored to each customer's unique preferences.

## TAKEAWAY:

Data science enables brands to make smarter decisions that drive more products into baskets. Advancements in AI that allow data scientists and business users to understand trends on a much more granular level in real time will further enhance the ability to forecast demands, trends and new product opportunities. Additionally, as AI regulations evolve, companies must stay vigilant in complying with the new regulations.

### AI ADVANCEMENTS TO WATCH

**These advancements are enabling the detection of more granular trends and insights.**

**DEEP LEARNING FOR TIME SERIES FORECASTING:** Advanced recurrent neural networks like transformers and temporal convolutional networks can uncover subtle patterns across variables like sales, traffic, pricing, promotions and sentiment, outperforming traditional statistical forecasting.

**CAUSAL ML:** Moving beyond correlation, new techniques in causal machine learning can model the causal relationships between different business drivers and outcomes.

**HYBRID AI ENSEMBLES:** Combining different classes of machine learning models such as graph networks, TensorFlow neural nets and tree-based models within ensemble systems often leads to boosts in predictive accuracy as models complement each other's strengths.

# #4

# More efficient inventory and supply chain management

CPGs and retailers have only just begun to scratch the surface of how advanced analytics and interconnected data can optimize inventory management and supply chain operations. The next decade will see data science, machine learning and AI bring CPG inventory management, production forecasting and delivery logistics to new heights of efficiency and precision.

At the heart of the revolution is the increasing ability to view the entire supply ecosystem as an integrated whole, breaking down silos through shared data layers, IoT sensor networks and blockchain-enabled transparency.

Armed with integrated data, CPGs can develop inventory optimization engines augmented by gen AI capabilities and human expertise. Systems that ingest endless signals — weather patterns affecting transport routes or crop yields, geopolitical shake-ups near key manufacturing hubs, holiday spending forecasts altering seasonal demand — can recommend inventory adjustments and flag potential issues before they occur. Supply chain organizations evolve from reactive to proactive.

Additionally, blockchain and RFID technologies will unlock real-time inventory tracking across distribution centers, trucks and store shelves. Execution systems can automate reorders based on more precise data. This level of system interconnectivity minimizes costly overstocks while eliminating out-of-stocks which plague shopper loyalty.

Overall, CPG brands will benefit from the transformation of inventory management into intelligent, predictive demand orchestration, harnessing market signals, channel data and shopper insights to mitigate supplier and fulfillment volatility.

## TAKEAWAY:

The future grocery supply chain is a competitive advantage for CPGs prescient enough to embrace data science now and build the integrated foundations necessary for optimal decision making at new levels. As the AI regulatory landscape shifts, firms must also adapt to comply with emerging regulations.

# #5
# Proactive insights

Historically, gathering comprehensive customer insights has been reactive, costly and time consuming. But new technologies are set to change that. Advanced predictive models with the ability to recognize patterns and estimate future developments are making it easier for business users without a technical background to gain visibility into emerging trends, topics and shifts in shopper behavior right as they start to gain traction.

Interactive virtual assistants powered by large language models, for example, are enabling highly detailed, immersive examinations of customer journeys. These gen AI-powered assistants could enable conversational mappings of customer journeys on an ongoing basis, piecing together motivations, preferences and decision drivers as actionable insights.

Brands can query these assistants to walk through common consumer routines, ask follow-up questions and visualize decision loops and pain points. With their ability to rapidly process volumes of data, the virtual assistants could easily construct nuanced customer journey models to uncover priorities and habits. What used to require months of research could be reduced to minutes.

## TAKEAWAY:

With their ability to rapidly sift through data, identify patterns and make predictions, advanced data analytic tools and technology are accelerating research, making it faster and easier to uncover unmet needs, identify emerging trends and identify the next best courses of action. The evolving regulatory landscape around AI also necessitates that companies stay vigilant in ensuring compliance with emerging regulations.

## DATA-DRIVEN RETAIL IS HERE

**From enhanced online grocery shopping and smart shopping carts to optimized inventory management and proactive insights, digital technology and data science are transforming the way we shop and interact with brands. At the same time, it is imperative that consumer privacy is respected and data is used responsibly at every stage.**

**By keeping the consumer at the center and prioritizing their rights and best interests, CPGs and retailers can build trust and realize the full potential of personalization, making grocery shopping more connected, proactive and customer-centric than ever before.**

# About us

84.51° is a retail data science, insights and media company. We help The Kroger Co., consumer packaged goods companies, agencies, publishers and affiliates create more personalized and valuable experiences for shoppers across the path to purchase.

Powered by cutting edge science, we utilize first-party retail data from over 62 million U.S. households sourced through the Kroger Plus loyalty card program to fuel a more customer-centric journey using 84.51° Insights, 84.51° Loyalty Marketing and our retail media advertising solution, Kroger Precision Marketing.

**LEARN HOW 84.51° CAN HELP YOU CREATE PERSONALIZED EXPERIENCES FOR SHOPPERS AND MORE. ›**