CORESIGHT RESEARCH

In partnership with Diebold Nixdorf

Reinventing Store Checkout: Minimizing Friction to Drive Business Growth

October 15, 2025

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Executive Summary

Out-of-stocks and long checkout lines remain two of the largest sources of in-store friction for shoppers, according to proprietary Coresight Research survey data—this friction causes them to leave the store and drives them toward e-commerce. Retailers now have access to a myriad of technologies and services, including associate devices and optimized store design, to reduce these and other sources of friction before and during checkout, as well as keep shoppers in stores longer.

Coresight Research Analysis

1. Store-Layout and Operational Improvements To Reduce Pre-Checkout Friction

- Design experts, by increasingly leveraging AI (artificial intelligence), can help optimize store layouts in ways that enhance both sales and the overall shopping experience.
- Various technologies, such as computer vision (CV), shelf-scanning robots and AI, can help remedy out-of-stocks, one of in-store shopping's biggest friction points, according to consumers.
- Currently, several retailers are testing technologies that enable shoppers to open locked retail cabinets to access products without the need for an associate's help, helping mitigate this intentional friction.
- Handheld mobile computers enable associates to provide expert assistance to shoppers, overcoming both turnover and training issues.

2. Technology Can Greatly Reduce Queue Times, Accelerating the Checkout Process

- A wide variety of checkout options, including CV-powered options, can reduce queue times by monitoring line lengths and alerting employees if queues get too long.
- Intuitive AI features can accelerate self-checkout rates by anticipating actions and utilizing specific features, such as CV-powered age and produce verification, which can also help support untrained employees.

3. The Right Mix of Humans and Technology Optimizes the Shopping Experience

- Each store or retailer has an optimal mix of both humans and technology, including cashiers and self-service options. For instance, while human-interface design in self-checkout systems (SCOs) can accommodate shoppers with diverse abilities and reduce the need for associate intervention, on-the-floor checkout options via mobile POS (point-of-sale) devices are a prime example of keeping associates on the store floor to interact with shoppers.
- Moving forward, simple shopper surveys will be essential to fine-tuning the shopping experience and ensuring return visits.

What We Think

Retailers can take advantage of several technology solutions and services to hold the line against the ever-increasing convenience of shopping online. Various technologies, including inventory-scanning robots and queue-monitoring solutions, address two of shoppers' biggest pain points, out-of-stocks and long checkout lines; these technologies also quantify line length and wait time, enabling retailers to set priorities and KPIs (key performance indicators). In addition to this wealth of technology, we view human associates as a crucial advantage that physical retailers possess over the online channel: they can assist shoppers, engage with them and learn their shopping preferences through the shopping and checkout processes.

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Introduction

Friction is the enemy of retail: it means delays, inefficiencies or irritations that make the shopper reconsider making a purchase, resulting in abandoned sales. It can happen at any point of the shopping journey—while searching for items, collecting them, proceeding to checkout or even during the checkout process itself. After the shopper has decided to make a purchase, small delays and irritations can still cause them to rethink their decision, resulting in the retailer losing revenue and perhaps, worse still, the customer for good.

Fortunately, there are changes that retailers can make to their physical stores, such as the total number and activities of store associates and technologies used before and during checkout, that can reduce friction to "save the sale" and win customer satisfaction and loyalty. This report explores key friction points across the in-store experience and offers practical solutions to help retailers streamline operations, reduce customer friction and enhance satisfaction—ultimately driving sustained business growth.

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Reinventing Store Checkout: Coresight Research Analysis

1 Pre-Checkout Friction: Improvements to Store Layouts and Operations Can Keep Consumers Shopping

There are several sources of friction that shoppers can experience during the pre-checkout shopping journey, which we summarize in Figure 1, alongside the various technologies that can alleviate these issues.

Figure 1. Selected Sources of Pre-Checkout Friction for Shoppers and Highlighted Solutions

Source of Friction	Solutions		
Out-of-Stocks	• Item tags (RFID (radio-frequency identification) tags)	• Computer vision (shelf-edge cameras; inventory scanning robots)	• AI data-analysis platforms, including demand forecasting that employs external data (such as demand signals and weather patterns)
Long Lines at Checkout	• Computer-vision line-monitoring platforms		
Lack of Associate Support at Checkout	• More intuitive user interfaces	• AI-powered tools, such as age and produce identification	• Notifications provided via mobile devices
Lack of/Untrained Staff	• Handheld computers	• GenAI (generative AI) assistants	
Inefficient Store Layouts	• Expert advisory services	• AI store-design tools	

Source: Coresight Research

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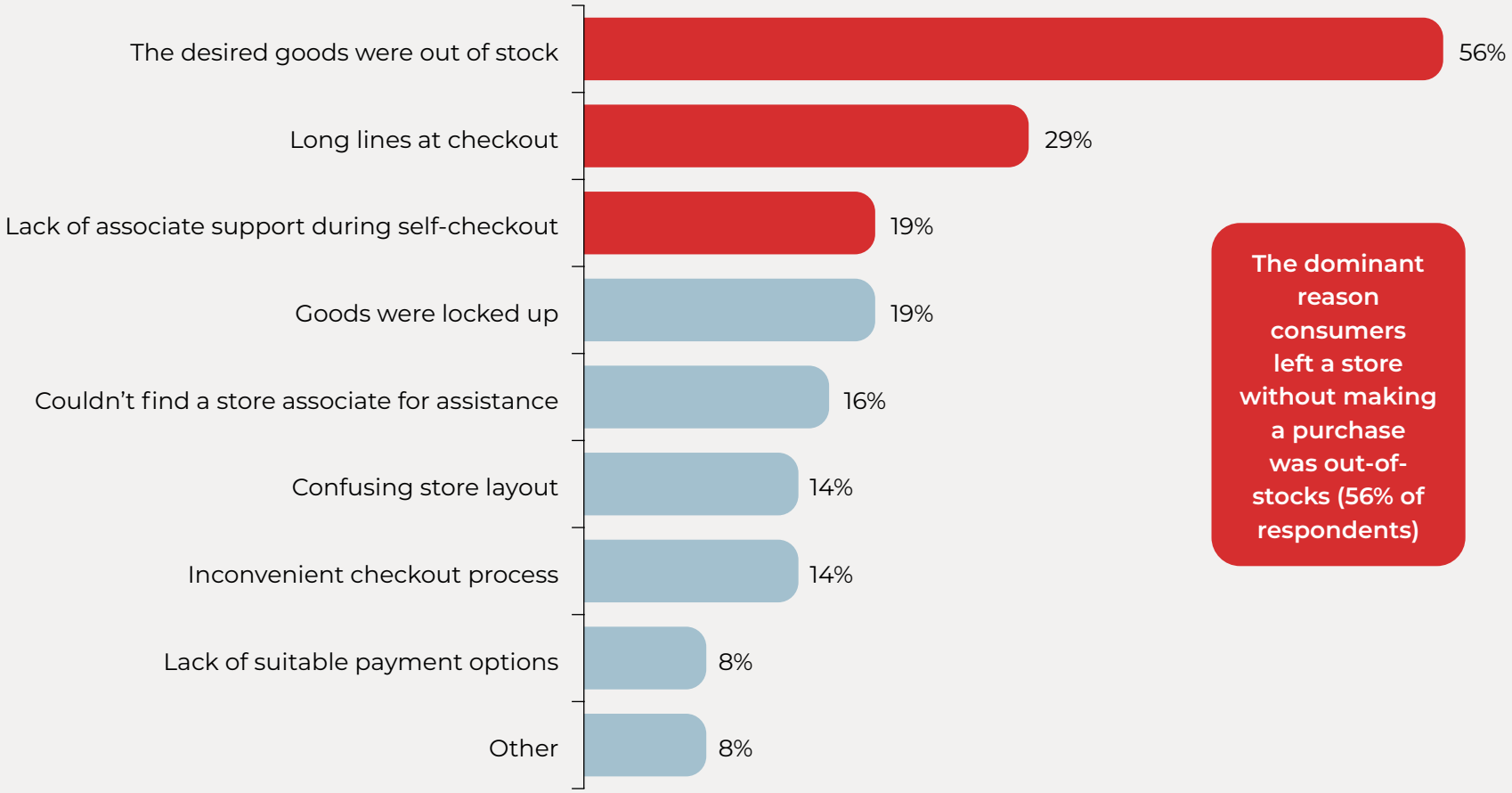
In a recent Coresight Research survey of 401 consumers conducted on August 11, 2025, two-thirds (66%) of consumers reported leaving a store without making a purchase in the six months prior to the survey. The dominant reason consumers left a store without making a purchase was out-of-stocks (56%), followed by two customer-service-related issues—long checkout lines (29%) and the lack of associate assistance during checkout (19%)—as shown in Figure 2.

Figure 2. Reasons Shoppers Left a Store without Making a Purchase (% of Respondents)



Base: 401 US consumers, aged 18+, surveyed on August 11, 2025
Source: Coresight Research

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Challenge: Inventory Issues (Including Out-of-Stocks)—Shoppers' Biggest Issue

Inventory issues, such as out-of-stocks and misplaced products, create friction for shoppers by disrupting their ability to find and purchase the products they desire, which can lead to basket abandonment (lost sales) and decreased loyalty: a Coresight Research survey of 394 US-based DIY (do-it-yourself), drugstore, grocery, mass merchandise and warehouse club retail decision-makers, conducted in March 2025, stated that they lost 5.5% (on average) of gross sales due to in-store inefficiencies in 2025.

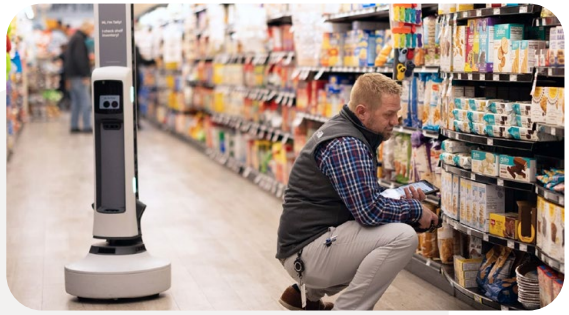
Solution: AI, Computer Vision and Robots Keep Inventory on the Shelves

There are several technologies available to remedy out-of-stocks and other inventory issues, many of which leverage fixed or robot-mounted cameras and analyze a combination of POS (point-of-sale) and inventory data.

- **Shelf-edge cameras**, such as those offered by **Hanshow** and **VusionGroup**, can continuously monitor shelf inventory; however, it should be noted that their accuracy is compromised if their view is blocked, and they require an up-front capital investment, in addition to ongoing maintenance and labor costs.

Shelf-edge cameras from VusionGroup
Source: Company website

- **Inventory-scanning robots**, such as those offered by **Badger Technologies** and **Simbe Robotics**, cruise store aisles (as shown in the image below), capturing real-time images of on-shelf inventory. In addition to capturing a "realogram" of shelf inventory, these robots can also detect items that are in the wrong location, as well as those that have pricing errors.



Shelf-scanning robot from Simbe Robotics
Source: Company website

- **AI-powered demand-forecasting and inventory-management software,** such as the software offered by **Invent.ai** and **RELEX,** can help align inventory with expected demand, keeping the right product, in the right quantity, in the right store at the right time.
- **AI-based solutions**, such as **Zebra**'s Inventory Optimization platform, analyze POS and inventory data opportunities, such as inventory not on the shelf but in the backroom, before turning those opportunities into tasks for associates.

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Challenge: *A Lack of Staff Frustrates Shoppers*

Retailers face many challenges in attracting and retaining associates, including growing competition from other sectors, such as restaurants and even food delivery. Entry-level sales associates make an average of $15.67 per hour, as of August 10, 2025, according to ZipRecruiter. In contrast, app delivery workers based in New York, New York, earn $21.44 per hour plus tips as of April 1, 2025, according to a New York city government press release. Additionally, the job-opening rate in the retail sector stood at 4.0% in June 2025, up from 3.2% a year ago, according to the US Bureau of Labor Statistics, which amounts to 60% annualized. These challenges reveal that many retail stores may be understaffed and that many available associates may be poorly trained or fresh hires, meaning they have no training whatsoever.

Solution: *Intelligent Mobile Devices Can Empower Associates to Improve Service*

Powerful mobile devices can help bridge the gap created by the combination of thin staff levels and a lack of employee training. In this age of advanced CV and GenAI, employee handheld devices can do more than simply scan barcodes. Today, mobile devices can help associates complete various tasks, including scheduling their shifts, which improves retention and morale, and clienteling (i.e., looking up relevant customer information), which improves their understanding of the shopper.

- A July 2024 Coresight Research study found that 34% of US retail employees (or 7.7 million employees) lacked dedicated mobile devices for their exclusive use.

Looking forward, new GenAI capabilities will be added to employee handheld devices, dramatically improving associate skill sets and reducing their trips to the back room to search through manuals for instructions and procedures; ultimately, these improvements will allow associates to spend more time with shoppers. Additionally, this new generation of handhelds can:

Associate operating a handheld computer with AI capabilities
Source: Zebra Technologies

- Scan shelves for planogram compliance and obtain inventory information to remedy out-of-stocks
- Obtain product information and make AI-powered, personalized recommendations
- Quickly look up company procedures, discounts and instructions on the store floor

- For more information on technology for associate enablement, please see our report, *RetailTech: Empowering Retail's Front Line, Creating Smarter Stores—Five Tech-Driven Strategies for Associate Enablement*.

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Challenge: Inefficient Store Layouts Confuse Shoppers

Store design is an art and science unto itself, employing both data and psychology across several key design areas:

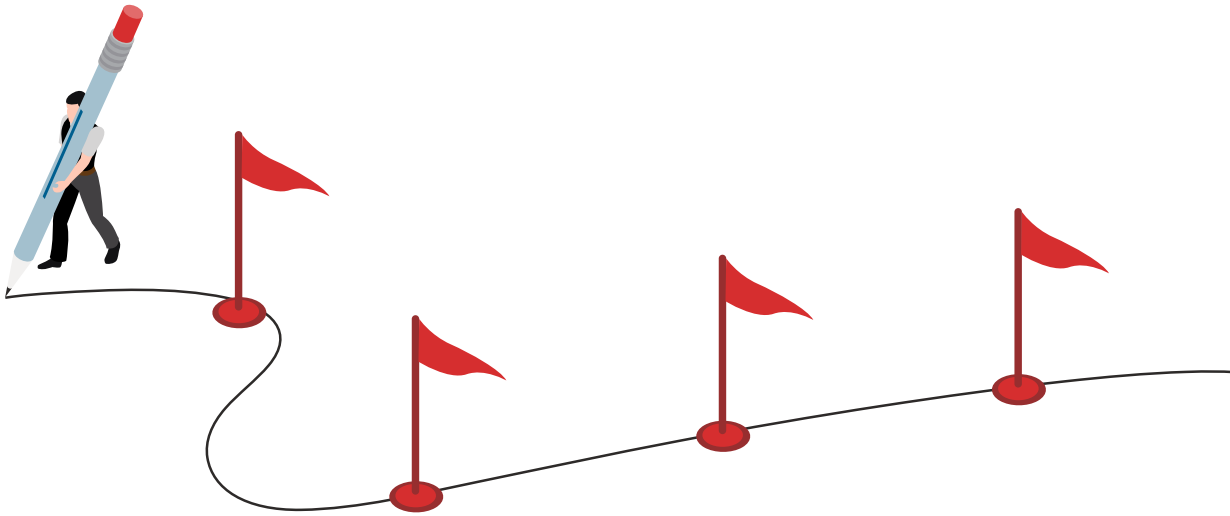
- Shopper comfort within the store, including creating "decompression zones" that contrast with high-traffic areas
- The placement of products, including their density and which products will be placed at eye level
- The inclusion of sensory items in the store, such as lighting, music and scents
- The placement of checkout stations, which can make a store feel organically designed or as though design was an afterthought

Poorly executed layouts, layouts that make the shopper feel that they are on a "racetrack" (i.e., a forced path that encourages sales), and confusing store layouts create friction for shoppers. In addition, some retailers constantly change the layout of their stores (a common occurrence in the grocery sector) in an attempt to make the stores seem fresh, which can frustrate shoppers who have learned the prior store layout.

Solution: Experts and AI for Optimized Store Layouts

Many architecture and engineering firms specialize in retail design, including **Core States Group**, **Gensler** and **Henderson Engineers**, while **Diebold Nixdorf** offers a suite of advisory services that profile a store and its shoppers, analyze store friction points, run shopper simulations, and execute the deployment of hardware and software solutions to optimize checkout processes. Diebold Nixdorf states that its advisory services result in a 12% increase in revenue, 71% greater availability and an 18% increase in sales volume (on average).

AI enables designers and others to create ultra-optimized store layouts. Demand planning vendors, such as **Blue Yonder**, **Invent.AI**, **Oracle** and **RELEX**, now offer space planning as part of their broad software portfolios. GenAI, in particular, promises to greatly aid store layout through the technology's ability to find relationships in structured and unstructured data via natural human language—i.e., a user could provide store layout and sales information and then request an optimal store layout. Additionally, digital twins can simulate changes to traffic flows from store layouts; for instance, **One Door** turns visual merchandising data into up-to-date store models.



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2 Checkout Friction: Technology to Reduce Queue Times and Accelerate the Checkout Process

Even after the shopper has selected their desired items and is ready to checkout, several factors can still cause them to abandon their purchase, including long checkout lines and poorly designed user interfaces.

Challenge: ***Long Checkout Lines Frustrate Shoppers***

Shoppers despise long checkout lines, particularly when a retailer is understaffed: as shown in Figure 2, 29% of shoppers had left a store without making a purchase due to long checkout lines, while 19% abandoned a purchase due to a lack of associate support during the self-checkout process. An irritated or irate shopper may leave the planned purchase while standing in the checkout line, exacerbating the appearance of other causes of friction seen earlier in the shopping experience, such as out-of-stocks.

Solution: ***Techniques and Technologies to Reduce Queue Times***

Several methods can minimize the time shoppers spend standing in line, such as queue-measurement companies like Qless, Qmatic and Waitwhile. For self-checkout options, assistance and training from store staff go a long way in helping shoppers efficiently scan their purchases, which brings down the number of issues overall.

Several retailers use CV or sensors for queue analytics to enlist additional cashiers if lines get too long, including Kroger, Target, Tesco and Walmart. For self-checkout offerings, usage statistics can help retailers determine if they need to install additional kiosks; for example, by examining the number of transactions processed per hour and the amount of time between transactions.

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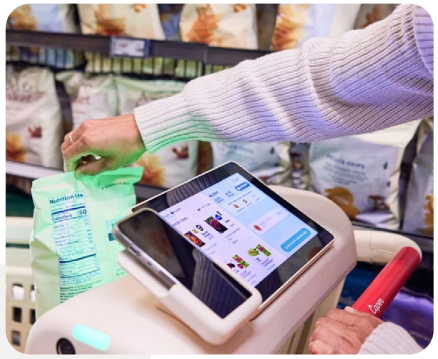
Retailers can also look to allow self-reliant shoppers to employ a variety of self-service options to avoid checkout lines, including:

- **Self-checkout kiosks (SCOs)**—Now ubiquitous, SCOs enable shoppers to scan and pay for their items on their own.

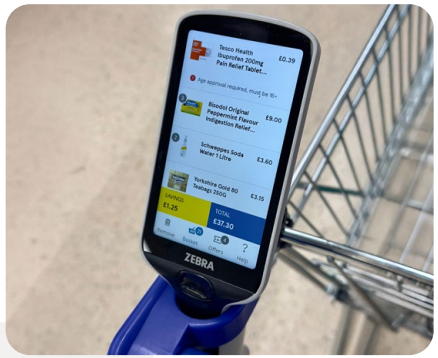
Source: Diebold Nixdorf

- **Smart carts**—These carts are essentially SCOs on wheels—the carts feature a mounted device that scans each item as the shopper puts them inside and allows for on-cart checkout.



Source: Instacart

- **Personal shopper scanners**—These devices, largely used in Europe, allow shoppers to pick up a scanner upon entering the store and scan individual items while shopping, as well as check out with the device.



Source: Zebra Technologies

- **Smartphone scanning apps**—Self-service apps, such as Sam's Club's Scan And Go app, enable shoppers to scan and pay for items via their smartphone.

Source: Sam's Club

- **Frictionless/checkout free**—The ultimate frictionless checkout technology uses a combination of CV and sensors to identify items picked up by shoppers, which are then tallied when the shopper leaves the store; an invoice is then sent directly to the shopper's registered account. Despite the elegance of this shopping format, the expense of the hardware and software required to power the in-store systems has made them not economically viable (generally).

Source: Amazon

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Challenge: Poorly Designed User Interfaces

Designing the user interface for devices such as SCOs requires a delicate balance of art and science: While engineers are wizards at designing efficient hardware and software, they often create interfaces for other engineers; in some cases, SCO user interfaces are ported from earlier POS implementations. Poorly designed user interfaces can slow and frustrate shoppers, leading to basket abandonment or, even worse, the shopper electing never to return to the store.

Solution: AI-Powered Services to Improve Checkout Workflows

"To err is human," according to the Latin proverb, and human shoppers often make errors during the self-checkout process—these errors can be classified as non-malicious (honest mistakes) or malicious (such as theft and fraud). Algorithms and AI can decide how to diplomatically handle non-malicious errors, taking into consideration their severity and the shopper's status, ranging from ignoring the error entirely to "nudging" the customer to correct the error or even locking up the SCO and requesting human intervention, which would slow the queue and inconvenience other shoppers. The platforms can also discreetly alert associates via mobile devices to situations requiring their assistance or intervention.

Everyday checkout functions—such as identifying produce and age verification for the purchase of alcohol, tobacco and other age-restricted items—can also cause delays for shoppers, and technology vendors are helping to simplify these functions. For instance, CV for age estimation is now fairly accurate, and many state-of-the-art kiosks come equipped with this function, preventing calls to associates to check IDs, which create delays. Similarly, although it is difficult for CV tech to distinguish between a Jonathan apple and a McIntosh apple, it is straightforward to distinguish an apple from a pear; as such, modern, CV-powered kiosks can present a customer with a few selections of apples, rather than having them leaf through pages of unrelated produce images. These CV functions can also assist untrained employees.

State-of-the-art POS systems are built on modern technology that also supports omnichannel functions, as compared to legacy, standalone or moderately integrated systems. Best practices also target POS uptime of greater-than 90%, as compared to industry norms of 80%–90% uptime, according to industry experts.

Moving forward, the AI implemented into SCOs will increasingly be able to learn—and anticipate—human behavior in order to speed the checkout process and reduce wait times.

The time spent checking out is also a concern for customers and retailers. Although checkout time varies with the number of items purchased, industry norms center for average checkout times around two to four minutes, while best practices aim for checkout times under two minutes, according to industry experts.

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3 The Right Mix of Humans and Technology Optimizes the Shopping Experience

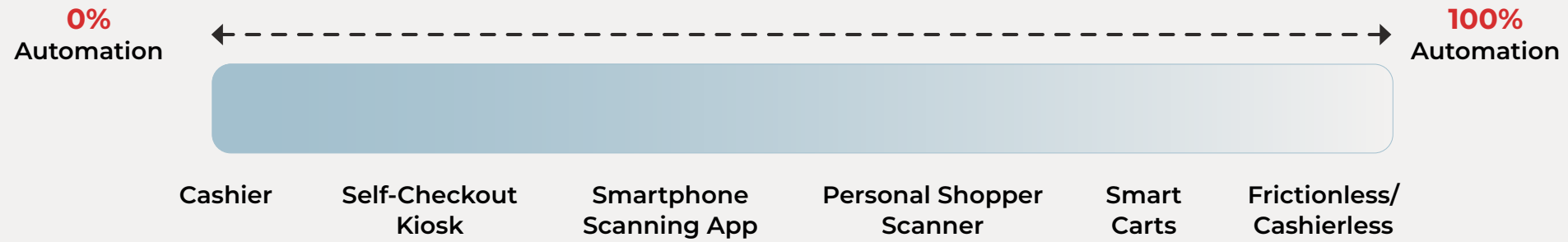
To enhance the shopping experience and optimize checkout processes, retailers must find the right mix of humans and technology; for instance, mobile POS devices help keep associates on the store floor and interacting with customers for longer. Over time, collecting data on customer satisfaction is essential in order to measure performance and remove friction.

Each Store or Retailer Has an Optimal Mix of Both Humans and Technology

To best serve shoppers, retailers need to determine their own optimal mix of human assistance and technology—self-reliant shoppers may prefer to scan items on their own, whereas others may prefer chatting with the cashier.

We showcase the spectrum of the human-technology mix in the retail setting in Figure 3. There are a wide variety of store configurations that combine traditional cashiers and smart carts, as well as cashierless areas, depending on what mix each retailer decides on. It should be noted that although SCOs are automated and generally considered a labor-saving technology, they still require labor via the stationing of associates to help shoppers with training, scanning problems and other issues that pop up. Industry leading checkout systems require only one floating employee or one per six or more lanes, as compared to industry norms of one employee for every four-to-six lanes, according to industry experts.

Figure 3. Spectrum of Human-Technology Mix



Source: Coresight Research

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Untethering Associates to Improve the Shopping Experience

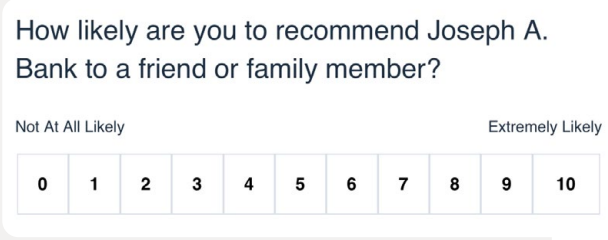
Mobile POS systems keep associates visible and engaged with shoppers throughout the entire shopping journey, as well as reduce checkout wait times by allowing customers to pay away from checkout areas. The Apple Store represents a classic example of a floor-checkout offering, with associates using modified iPhones to complete purchases. However, there are a variety of forms these offerings can take, based on the smartphones or tablets used to enable floor checkout; for instance, many mobile POS tablets can detach from their dock to enable the associate to meet a shopper on the store floor to complete a purchase, as well as re-dock the tablet to complete a transaction in the checkout area.

Undocked mobile POS tablet from HP
Source: Company website

Gauging Customer Satisfaction Is Essential

Designing a store based on data, let alone intuition, is rarely sufficient: customer feedback is a key data source—in addition to traffic and sales data—when looking to continue to calibrate the store configuration to shopper preferences.

While many retailers send out e-mail surveys following a store visit, these surveys are often cumbersome to complete. At first, these e-mail surveys appear simple enough; however, clicking on the first 0–10 score only leads to another page, where the shopper is asked for a review or more detailed questions, often leading to survey abandonment and invalidated results. We believe that simpler solutions—such as "smiley" buttons (happy, neutral, sad)—would likely prompt a higher percentage of shoppers to complete the survey.



Sample e-mail customer survey from Joseph A. Bank
Source: Company email

- Asia-based health and beauty retailer **AS Watson** conducts monthly surveys across all its markets, collecting data on its service, products and the store environment, which is used to calculate a "Customer Love Score" (on a 1–100 scale, with 100 being best). The retailer then highlights its top-scoring stores each month.

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What We Think

Retailers can take advantage of several technology solutions and services to hold the line against the ever-increasing convenience of shopping online. Various technologies, such as inventory-scanning robots and queue-monitoring solutions, address two of shoppers' biggest pain points, out-of-stocks and long checkout lines. Still, despite this wealth of technology, we view human associates as the one crucial advantage that physical retailers possess over the online channel: they can assist shoppers, engage with them and learn their shopping preferences throughout the shopping and checkout processes.

Implications for Brands/Retailers

- Retailers need to prioritize out-of-stocks and other sources of inventory-related friction, which can be addressed via cameras, robots or AI.

Brands or Retailers Poised to Gain Advantage

- Retailers that provide on-floor checkout options, such as the iPhone-based checkout system at Apple stores, create more opportunities for associates to engage with shoppers and save shoppers from the tedium of standing in line.
- Retailers such as Kroger, Target, Tesco and Walmart are already using CV to manage queues and reduce checkout wait times.

- Retailers should also prioritize reducing checkout queue lengths via CV and other technologies, as long lines represent a major pain point for shoppers.

Brands or Retailers That Risk Losing Advantage

- Retailers that do not address out-of-stock issues are likely exposing themselves to a significant source of abandonment by shoppers.
- Retailers that do not optimize their store layouts could inadvertently be increasing friction, ultimately leading to lost sales.

Implications for Technology Vendors

- There are multiple areas for technology vendors to develop solutions to solve out-of-stock issues, including shelf-scanning robots, fixed cameras and AI-powered platforms.
- Retailers can look to work with vendors that are developing more intuitive or user-friendly checkout interfaces, helping to keep shoppers returning to stores.

- GenAI, though its ability to find relationships in many data formats, enables more retailers to optimize their store layouts and configurations dynamically, while leveraging store-specific data for precise insights and recommendations.

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Notes and Methodology

Data in this report are as of August 14, 2025.

Informing the data in this report are four online surveys of US consumers aged 18+, conducted by Coresight Research. The results have a margin of error of ± 5%, with a 95% confidence interval.

- 400 retail decision makers surveyed on July 8, 2024, operating in the retail sector on their mobile device usage, barriers to adoption and business functions for mobile devices.
- 394 business decision makers surveyed in March 2025 about technology adoption, challenges, pricing and promotion, labor-related tasks, store-related financial losses and their technology investments.
- 406 respondents surveyed on June 16, 2025, about their shopping and spending habits, and apparel purchases. Labor Day shopping plans and perspectives on retail shrink.
- 401 respondents surveyed on August 11, 2025, about their shopping and spending habits, including home furnishings, holiday and Singles' Day spending plans and GenAI usage.

Companies mentioned in this report are: Amazon.com, Inc. (NasdaqGS: AMZN), Apple Inc. (NasdaqGS: AAPL), Aptos, LLC, Auror Limited, Blue Yonder, a division of Panasonic Holdings Corporation (TSE: 6752), Core States Group, Genetec Inc., Gensler, Hanshow Technology Co., Ltd. (SZSE: 301275), Henderson Engineers, Inc., HP Inc. (NYSE: HPQ), Insight LPR, Instacart, a division of Maplebear Inc. (NasdaqGS: CART), Invent.AI, Jos. A. Bank, One Door, Oracle Corporation (NYSE: ORCL), Qless, Qmatic, RELEX Solutions, Sensormatic, a division of Johnson Controls International plc (NYSE: JCI), Simbe Robotics, SYNQ Technologies, Target Corporation (NYSE: TGT), Tesco PLC (LSE: TSCO), The Kroger Co. (NYSE: KR), Verkada Inc., VusionGroup S.A. (ENXTPA: VU), Waitwhile, Walgreens Boots Alliance, Inc. (NasdaqGS: WBA), Walmart Inc. (NYSE: WMT), Zebra Technologies Corporation (NasdaqGS: ZBRA)

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Diebold Nixdorf is a global provider of solutions for banking and retail. The company's portfolio of retail solutions includes products, services and solutions that improve the checkout process for retailers while enhancing experiences for shoppers.

For more information, visit www.dieboldnixdorf.com

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