

Retail Practice

RFID's renaissance in retail

A new era brings a familiar technology to the forefront for nongrocery retailers.

by Praveen Adhi, Tyler Harris, and Gerry Hough



Retail is once again entering new territory as the COVID-19 pandemic changes the game. Retailers now have near-term, immediate decisions to make, including how to bring back and redeploy the workforce and how to protect the health and safety of shoppers and employees. Beyond these immediate concerns, retailers have an unprecedented opportunity to reimagine store operations. Consumers are more receptive than ever to changes that can make the in-store experience safer, more accessible, and more convenient.

Responding to shifts in consumer behavior, retail supply chains and stores have produced a flurry of curbside operations, “dark stores”—physical locations that are closed to customers and serve as fulfillment centers or distribution points—remote-selling options, and other innovations. Stores will inevitably serve new roles in the “next normal” shopping journey, and retailers will be (and already are) looking for ways to improve operations and reduce costs. In this new era, we believe radio-frequency identification (RFID) has the power to unlock up to 5 percent top-line growth from better stockout management and shrinkage reduction as well as to achieve a 10–15 percent reduction in inventory-related labor hours.

A new era revives a familiar technology

Stores no longer play an occasional supporting role in the omnichannel shopping journey. As retailers try to shift more omnichannel fulfillment to offline channels—often the most feasible and profitable last-mile fulfillment option (Exhibit 1)—stores and their supply-chain tethers are retaking center stage in the evolving customer journey.

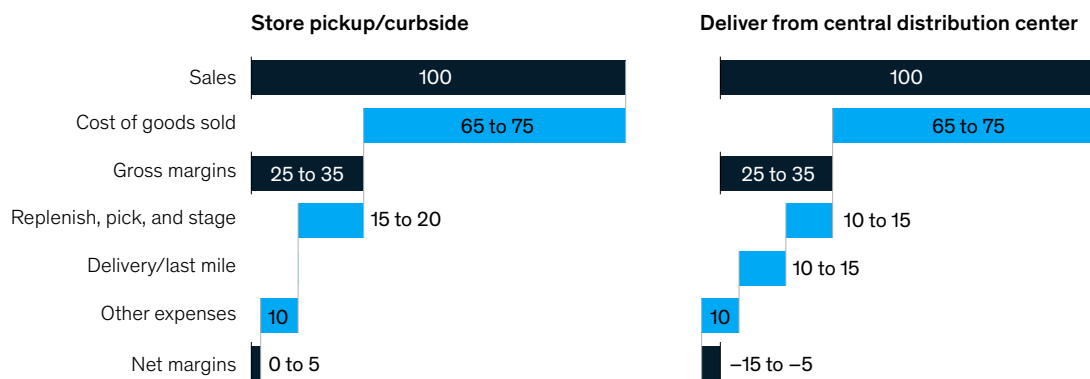
These new demands inevitably challenge retailers to rethink store priorities, processes, and systems. To make room for new omnichannel activities, traditional in-store tasks must be endlessly reprioritized and simplified, without compromising on the in-person customer experience. And to provide a flawless yet profitable clicks-to-bricks experience, retail inventory and systems need to become more sophisticated, precise, and unified from end to end.

Together, these changes have brought a familiar technology—RFID—back to the forefront for many retailers. After a nearly 20-year “incubation,” with advances in readability, range, and cost, RFID stands poised to address precisely the use cases that stand at the center of today’s need for more

Exhibit 1

For many retailers, stores remain the most profitable fulfillment option.

Typical US e-commerce margin structure for apparel, illustrative, % of sales



omnichannel, more data-driven, more accurate, and more customer-driven shopping experiences.

In this article, we focus on nongrocery retailers to discuss the extraordinary value of the technology; how nongrocery retailers can harness it now; and what retailers, technologists, and manufacturers will need to do to advance RFID into future generations of brick and mortar.

RFID: How it works

At the highest level, RFID ecosystems and componentry involve four main elements (Exhibit 2):

- *RFID tags* store and transmit encoded information about individual products.
- *Reader hardware* (fixed or mobile) sends and receives signals allowing it to “read” and interpret data transmitted from a tag, and *antenna hardware* converts signals between readers and tags, effectively enabling the reader to identify a tag’s presence, ID, and location. An antenna can be integrated into a reader, or several can be connected to increase coverage.

- *Supporting software* or services encode tags and process RFID data for end use.
- *Testing and certification* test and certify tag inlays for retail uses and materials for retailer and supplier assurance.

Putting these components together requires finesse for every retailer’s product and box design—it takes time, commitment, and collaboration. However, the benefits have evolved over recent years to prove the business case for many large retailers.

The ongoing evolution

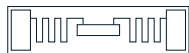
One of the largest unlocks of RFID in recent years lies in the business case. The average cost of an RFID tag has fallen by 80 percent to about four cents¹ in the last decade, while read accuracy has doubled and range more than quintupled (which allows for fewer devices and better reads). Even the prices of RFID readers have dropped by nearly 50 percent.

Modern RFID solutions can reset store economics, lowering costs and boosting revenue. Our research shows that demonstrated benefits include more

Exhibit 2

RFID solutions require four key components that work together to meet a variety of needs.

RFID¹ ecosystem and componentry



RFID tags
 Programmable UHF² and HF³ tags to affix to products, active or passive, hard or soft



Readers and antennae
 Long- and short-range readers and antennae to provide power and range



Supporting software
 Supporting services or software to encode tags and process RFID data for end use (eg, associate apps)



Testing and certification
 Tests and certifies tag inlays for various retail uses/materials for retailer and supplier assurance

¹Radio-frequency identification.
²Ultra-high frequency.
³High frequency.

¹ Cost for an average ultra-high frequency RFID tag; actual price points can vary based on specifications and purchase details, including the size of the order and how many tag deliveries a customer takes.

than 25.0 percent improvements in inventory accuracy, 1.0–3.5 percent increases in full-price sell-through tied to better management and lower stockouts, 10.0–15.0 percent reductions in inventory-related labor hours, and reductions in shrinkage and theft that can raise revenue by up to 1.5 percent.

With recent progress as fuel, the pace of experimentation and progress is accelerating. For example, the CHain Integration Project (CHIP), spearheaded by Auburn University's RFID Lab, seeks to create a secure and common framework to share RFID data across multistakeholder supply chains—thereby attacking costly sources of friction such as visibility, shrink, claims, and damage.

The technology has evolved enough to become essential in today's rapidly changing marketplace. It can help retailers speed the transition to becoming fully omnichannel, for example, by providing in-store inventory numbers accurate enough to power buy

online, pick up in store, and curbside pickup and to boost agility in responding to supply-chain shocks. It can power contactless-checkout capabilities and unlock new customer experiences to create cross-sell opportunities.

Use cases for RFID fall into three main categories




As technology vendors proliferate and offer an ever-expanding array of products and services, we urge retail leaders to stay focused on end-to-end experiences and the underlying use cases required to support those experiences. We also recommend selecting interoperable tools, which connect seamlessly with other technology and may even help users achieve multiple strategic goals.

Indeed, versatile technology can unlock value across a range of use cases in three main categories: inventory tracking, store operations, and customer experience (Exhibit 3).

Exhibit 3

Three primary use cases exist for RFID in stores, with differing levels of industry maturity.

RFID¹ use cases

			
	Inventory tracking	Store operations	Customer experience
Status	Pilots Multiple examples	Nascent stages	Nascent stages
	Scaled success Multiple examples	Gaining steam	Nascent stages
Examples	<ul style="list-style-type: none"> ● Automated cycle counting ● Accurate product-location information ● Improved replenishment planning and ordering 	<ul style="list-style-type: none"> ● Automated restock or pick notifications for employees ● Automated asset protection ● Efficient and accurate self-checkout 	<ul style="list-style-type: none"> ● Triggered digital experiences ● Personalized recommendations and cross-selling triggers

¹Radio-frequency identification.

Inventory tracking

Inventory tracking is the most well-understood and widely used RFID application in retail. Accurate product-location information can lower the cost and complexity of managing inventory, speed picking, and packing and delivery and can boost customer satisfaction. Therefore, tracking should be the starting point for many retailers, with the important benefit of unit-level tagging that lays the foundation for other use cases.

An example of more accurate product-location information

Out of the box, RFID can provide highly accurate information about where an item is in the supply chain, such as on a truck or in a specific store, and where to find it in the store. This helps store managers plan and adjust staffing based on quantities and the timing of truck arrivals and improve pick timing for online orders, store replenishment, and customer requests. While RFID can also provide microlocation information at the shelf level, this typically requires larger investments that may not pay off except in high-volume or high-value environments.

Athletic-apparel retailer lululemon athletica uses product-location information to deliver a more flexible, omnichannel fulfillment model. The retailer uses RFID tags throughout its network of nearly 500 stores and boasts a resulting 98 percent inventory accuracy and a payback period of one year or less. During the COVID-19 pandemic, lululemon used this location information to manage inventory levels as customer demands shifted. CEO Calvin McDonald explained that by using RFID, “we can access product at any point across our network, not just distribution centers but at our stores as well [as] from ship from store.”

Some retailers are better positioned to capitalize on these capabilities more quickly than others. Those who have benefited most from inventory are either vertically integrated, which smooths the path to upstream product tagging, or predominantly sell soft goods, such as apparel, that offer the most favorable physical characteristics for RFID tags.

We believe broad expansion to multibranded and mixed retailers is possible and well within reach—but successful implementation in these formats requires even closer collaboration and creativity among retailers, product manufacturers, RFID experts, and integrators.

Store operations

Once products are RFID tagged, retailers should pursue additional use cases in stores to boost cost savings, productivity, and revenue. New operational use cases are keys to more efficient store processes that better meet customer needs and shift associate priorities as omnichannel's role and margin structure evolve.

An example of efficient and accurate checkout

Shoppers are increasingly willing to scan universal product codes (UPC) in self-checkout systems, and RFID tags can make self-checkout even faster and more accurate. Decathlon, a sports-equipment retailer with over 1,600 stores in more than 50 countries, tags more than 85.0 percent of items, tripling labor productivity and cutting stockouts to raise revenue by 2.5 percent. The retailer is also testing several RFID-based checkout solutions. For example, its scan-and-go solution in Europe allows shoppers to scan and pay for items with their smartphones, automatically disabling RFID tags and avoiding checkout lines altogether. In an era of physical distancing, helping shoppers avoid close contact with checkout staff could be a competitive advantage.

Checkout's not-so-distant cousin—the return—is becoming a more important ingredient in customer satisfaction. With e-commerce activity on the rise and about 20 percent of orders being returned, quick, accurate, and efficient processing, which includes a return in the salable-inventory pool, reduces costly margin erosion on items otherwise lost in the reverse supply chain.

Customer experience

While the most valuable RFID use cases today are in inventory tracking and store operations, several

Out of the box, RFID can provide highly accurate information about where an item is in the supply chain, such as on a truck or in a specific store, and where to find it in the store.

“last mile” advances can attract customers looking for dynamic new experiences, drive revenue, and yield valuable behavioral insights.

An example of customer-centric digital activations

RFID-enabled activation can take a variety of forms. Some retailers now provide “smart” fitting rooms, where shoppers get customized information about other sizes and colors in stock, learn how to style a garment, and receive personalized recommendations for items that will complete a look. Chanel’s collaboration with Farfetch does exactly that. The high-tech, RFID-enabled fitting rooms take the shopper on a digital journey of new styles, product details, and the Chanel lifestyle all without leaving the room. In return, retailers can gather high-level data, such as how many items customers try on and conversion and abandon rates by product.

Other retailers use RFID to trigger experiences for customers and provide them with information. For example, Kendra Scott trialed an RFID-enabled activation in its Color Bar in stores. Customers could select jewels from a display to trigger a customization experience. Engagement doubled and customers relied more on self service, which will likely become more important.

Players across the RFID ecosystem will need to work together

The retail value chain depends on the many players who move products from their point of manufacture

to their final destinations: in customers’ hands.

No single actor in that chain can dictate which RFID systems will be adopted or how they will be used across the ecosystem. Collaboration among the following leaders throughout the industry will be required for smooth, successful implementation: retailers, factories and manufacturers, integrators, and device and technology providers—a group that can fittingly be abbreviated as R-F-I-D.

- **Retailers** can lead the way by committing to adopt RFID. New-format adoptions improve processes, standards, and economies in upstream manufacturing and tagging, which in turn improve the ROI and scalability for others.
- **Factories and manufacturers** help by tagging products at the source, where process and labor efficiencies are far greater than in distribution centers—and exponentially greater than in stores. They help improve upstream supply-chain visibility so retailers can improve receiving plans and manufacturers have more accurate ledgers of shipping and receiving activities. That can significantly reduce the cost and work associated with chargebacks (which can represent 1 percent of total retail sales²) and shrink and allow for better detection of counterfeits.
- **Integrators**—including strategic and systems integrators—are vital. RFID implementations typically span several months and require careful planning and coordination across retailers,

² *CHIP proof-of-concept whitepaper*, Auburn University RFID Lab, March 2020, info.rfid.auburn.edu.

suppliers, distributors, and providers of technology that includes tags, hardware, software, and analytics. A strategic integrator provides end-to-end expertise, vendor- and technology-agnostic advice, and “air traffic control” in the ecosystem, bringing solutions and economics together in ways that work for retailers. Strategic integrators can also help create data and analytics roadmaps that systems integrators can use to ensure that data are usable across the value chain. With RFID’s abundance of technology choices, category and product nuances, and inevitable prioritization efforts, each of these roles can be essential.

- *Device and technology providers* are the pillars of every RFID system, of course. They provide the tags, readers, and antennae to make the system work and are at the forefront of innovation and related business-case attractiveness, including readability, read ranges, tag sizes and properties, product extensibility, and data collection and use.

Next steps

Retailers worldwide are struggling with slowdowns, lockdowns, and sharp declines in consumer confidence and spending power, even as next-gen products proliferate and tech vendors clamor for attention.

While RFID holds the potential to tremendously impact a retailer’s profit and loss and alleviate pressure in our current environment, capturing the value can be complex. Success goes far beyond technological expertise and reaches into functions across the entire retail business.

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To ensure success, retailers will need to take the following actions:

- *Make cross-functional changes.* These changes range from product design and merchandising to store and supply-chain processes, to name a few.
- *Have an agile mindset and a team ready to rapidly test and learn.* Some retailers may find that testing in a dark store before rolling out helps to iterate and refine the solution quickly. RFID will not work flawlessly from day one and requires a commitment to iteration.
- *Adopt a holistic, end-to-end approach.* To extract the maximum value and reach the best ROI, retailers should consider multiple end-to-end use cases for the technology.
- *Ensure commitment from cross-functional leaders.* While RFID is a technology solution, it requires buy-in from the top-most leaders in the organization to ensure that merchandising, design, operations, and technology decisions are aligned to ensure success.

In today’s retail environment, RFID’s applications have never been more important. With lowering costs, the technology is also now more accessible than before. However, implementing RFID is not for the faint of heart, and requires a clear focus on the use case at hand as well as a commitment to making the cross-functional changes required for success.