

**FUTURE
PROOF
RETAIL**

An illustration of a woman with long black hair wearing a VR headset, sitting on a light-colored sofa in a bright room with large windows. She is interacting with a large, semi-transparent blue virtual screen. On the screen, there is a media player interface with a play button, a progress bar, and skip buttons. To the left of the woman, a virtual shopping cart icon is visible. Above her head, a red exclamation mark is shown. In the background, there are various virtual elements: a makeup kit with a brush and mirror, a door with a potted plant and boxes, and a handbag. The overall scene represents a futuristic retail experience.

Distribution Center

Autonomous Micro-Fulfillment Centers

Meet Retail's Ghost Kitchens: Autonomous Micro-Fulfillment Centers

You're deep inside your personal VR universe, where a book isn't just read but heard and seen all at once. Suddenly, the experience pauses — an alert flashes.

"Ring, ring!" A live feed of your front door fills the projection. Looks like the order you placed a mere 15 minutes ago has already been delivered from the Autonomous Micro-Fulfillment Center (AMFC) operating in a backroom of a store near your apartment building. You open your front door just in time to see the delivery robot glide back into the elevator.

Inside the shopping bags are products from your favorite makeup store, grocery chain, and hardware store. Now, shoppers like you benefit from lightning fast, no-contact delivery from all your favorite stores at once due to the speed of execution that's possible with AMFCs.

AMFCs are technology-powered "warehouses" staffed with both human employees and robots that work around the clock to fulfill orders. What makes them unique is their ability to deliver to nearby customers faster than ever before. Currently, we're seeing micro-fulfillment centers take shape in the form of on-site order fulfillment, in which retailers, using automated technology, fill online and pickup orders for local customers in the stock rooms of their brick-and-mortar stores instead of remote warehouses. One of the keys to establishing AMFCs is that the store backroom or stockroom is systematically designated as a separate inventory location from the store itself so the automated technology can pull inventory distinctly from the local backrooms or stockrooms. According to [Retail Dive](#), one major big box retailer began implementing AMFCs in some of its stores as early as 2021.

Located within densely populated neighborhoods and urban hubs, networks of hyper-local, automated facilities will soon enable commerce brands to enhance customer satisfaction through expedited delivery. Retailers could also choose to share space with other brands, offering customers a wider range of product options and creating a one-stop shop for everything from food to pharmaceuticals, clothing, and more.

[According to one automated warehouse solutions company](#), data collected from AMFCs' operations is already being leveraged to "inform product recommendations, personalize delivery windows, and even guide in-store merchandising," signaling that never-before-seen levels of convenience could be on the horizon.

In a world where customer expectations for speed have reached unprecedented levels and supply chain disruptions are frequent and difficult to anticipate, AMFCs offer small and mid-size retailers the opportunity to compete with larger brands. By fulfilling orders faster, retailers can greatly enhance customer experience.



Rerouting Retail for Lightning-Fast Fulfillment

CH.2

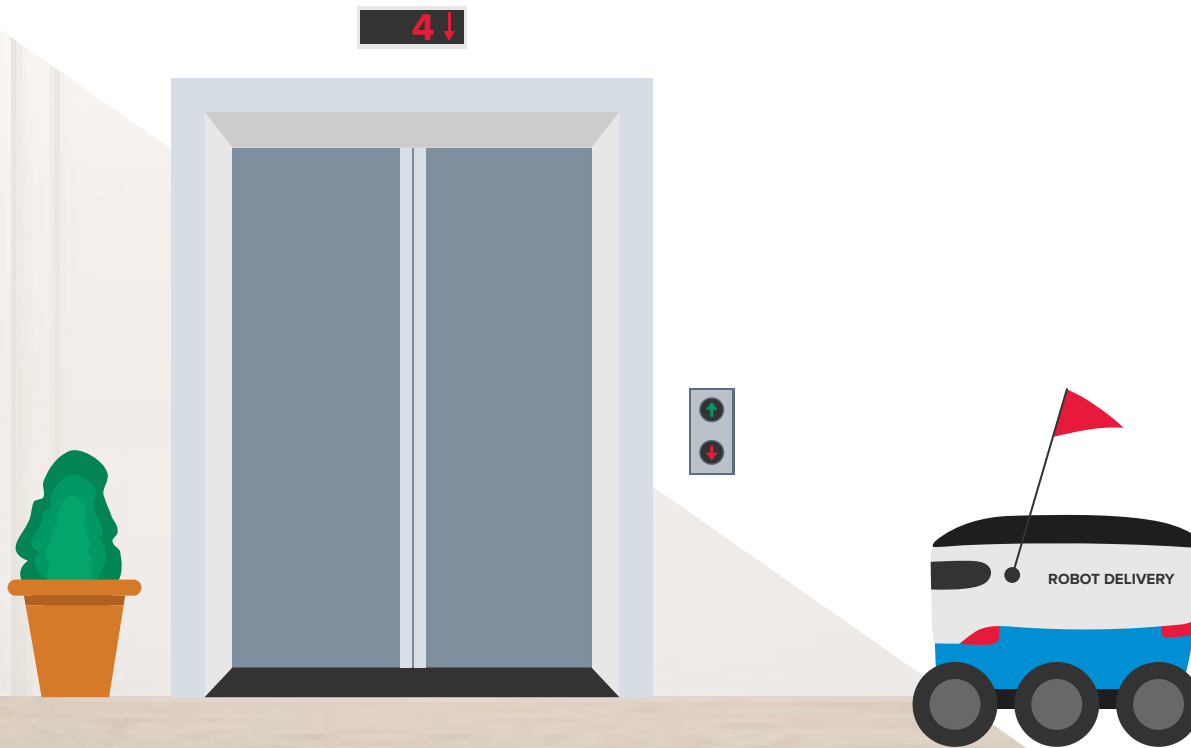
Major retailers' delivery capabilities have skyrocketed, making reliance on traditional fulfillment models a competitive liability. Now more than ever, shoppers increasingly expect same-day delivery — once considered a premium offering — making speed of fulfillment a primary differentiator for customers choosing between retailers. [According to a 2024 e-commerce report](#), 36% of U.S. customers are likely to turn away from a brand if they lack a convenient delivery option.

In addition to offering consumer benefits, AMFCs strengthen retailers' operational resilience. Their distributed nature reduces the possibility of single points of failure, such as a major distribution center going offline due to a system outage. Localized inventory management further cuts transportation dependencies. When products only travel a short distance from warehouse to destination, fewer factors threaten to disrupt on-time delivery. This helps retailers avoid the cascading challenges that can arise from cross-country delivery, using shorter, more controlled routes to make supply chains more predictable.

Artificial Intelligence (AI) is one way retailers are capturing efficiencies. AI supports conscientious energy use in micro-fulfillment centers by learning and adapting to real-time demand signals, just like smart thermostats adjust automatically based on occupancy and usage patterns. In practice, this could include using AI to analyze buying trends, location activity, and seasonal shifts, then using these insights to forecast demand and right-size energy-intensive operations — from warehouse lighting and climate control to automated sorting systems — based on predicted activity levels.

Similarly, AMFCs reduce energy usage by aligning operations with actual customer demand. By optimizing labor and transportation schedules to avoid overcapacity and improve inventory accuracy, AMFCs help retailers achieve same-day fulfillment while avoiding unnecessary movement and storage of products.

As AMFCs become increasingly viable, retailers must either adapt or risk losing market share to digitally native competitors who have already embraced these advanced fulfillment capabilities.



Making Micro-Fulfillment Sustainable

CH.3

Shoppers continue to hold companies accountable for their sustainability commitments, even amid shifts in ESG messaging and regulatory crosswinds. This means that retailers who choose to implement AMFCs will also want to rethink how they measure their environmental impact. One of the stand-out benefits provided by AMFCs is the ability to help retailers make progress against their sustainability goals through energy-efficient operations. For example, shortening last-mile delivery routes reduces retailers' carbon footprints.

Embracing environmentally friendly practices in the supply chain can reduce operational and reputational risks, while also future-proofing the business to better report on their sustainability efforts. Enhanced reporting can help retailers in the face of regulatory changes.

Integrated data infrastructure — centralized systems that unify data across the supply chain — can help retailers achieve their sustainability goals by tracking carbon footprint reduction while improving order accuracy, fulfillment speed, and stock availability. Brands that don't yet track sustainability metrics should do so as soon as possible to measure both their overall sustainability progress and the impact of AMFCs.

Retailers could first set up a system that creates a baseline of current emissions from their traditional fulfillment methods. This might include real-time tracking of carbon footprint per order, energy consumption patterns, and delivery route optimization. After implementing AMFCs, this process will enable retailers to measure sustainability improvements and track emissions with greater clarity, enhancing both reporting and decision making.

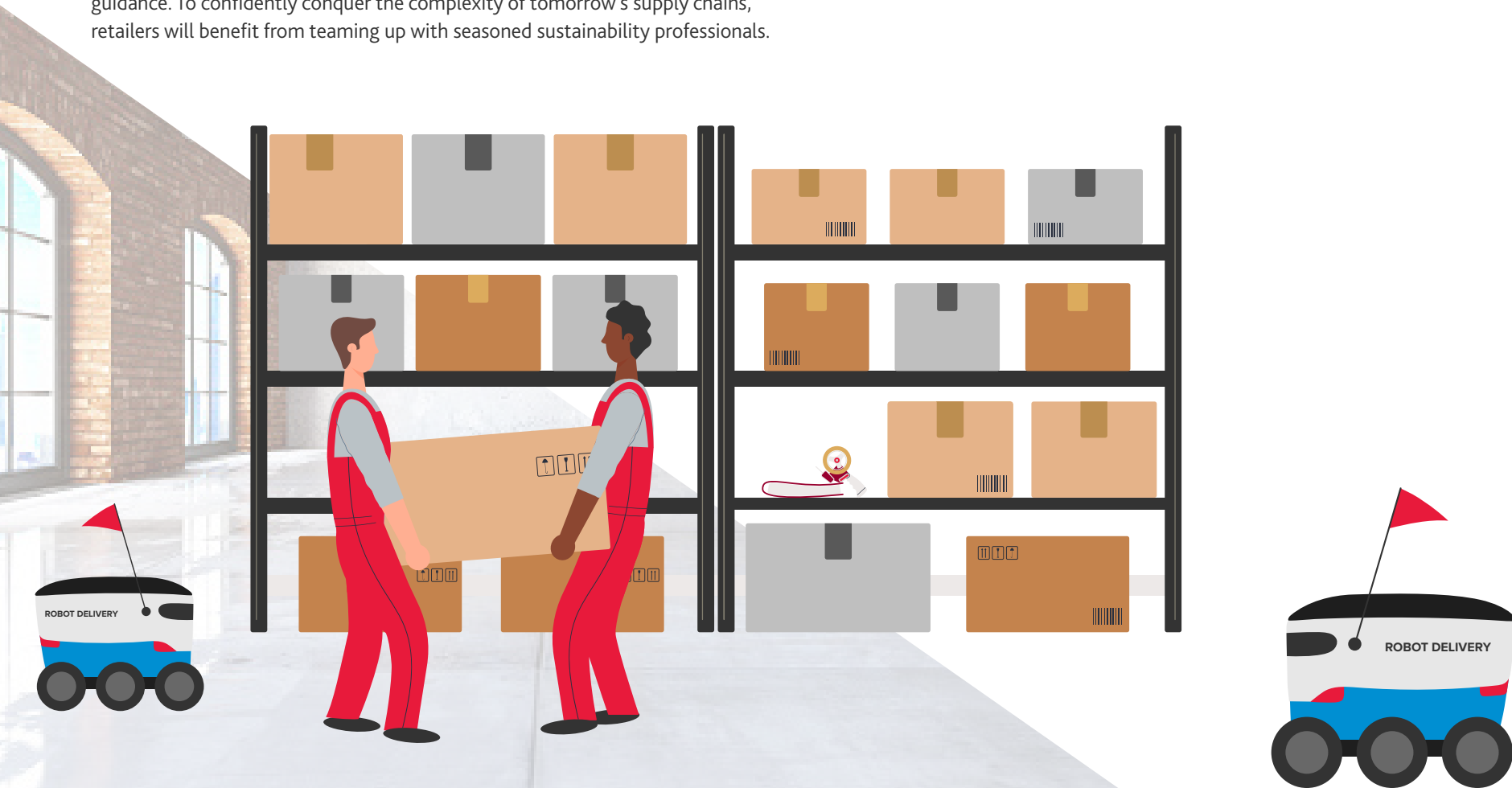
Data offers retailers the means to reduce fuel consumption, packaging waste, and overall environmental impact across their fulfillment networks. By pairing a strong data foundation with AI, retailers can shorten delivery distances by implementing proximity-based fulfillment and reduce excess plastic and boxes by consolidating deliveries by neighborhood or building.



But without proper data infrastructure and robust supply-chain mapping, AMFC implementation may not translate to a lower carbon footprint or faster delivery times. Retailers must consider several improvements to their supply-chain management before breaking ground on their fulfillment hub. For example, inventory tracking systems should be in place before automation is introduced. Without real-time reports across suppliers and regions, retailers risk triggering unnecessary stock transfers between locations based on outdated inventory data.

When real-time product visibility and traceability is clear, retailers can refine transit routes and measure carbon emissions on a more granular level. Traceability systems are critical for comprehensive supply-chain mapping and identifying efficiencies and cost-savings opportunities, while also allowing companies to validate their environmental impacts.

But visibility alone isn't enough — acting on these insights requires strategic guidance. To confidently conquer the complexity of tomorrow's supply chains, retailers will benefit from teaming up with seasoned sustainability professionals.



How BDO Can Help: Establishing the Infrastructure Today to Help Optimize Supply Chains Tomorrow

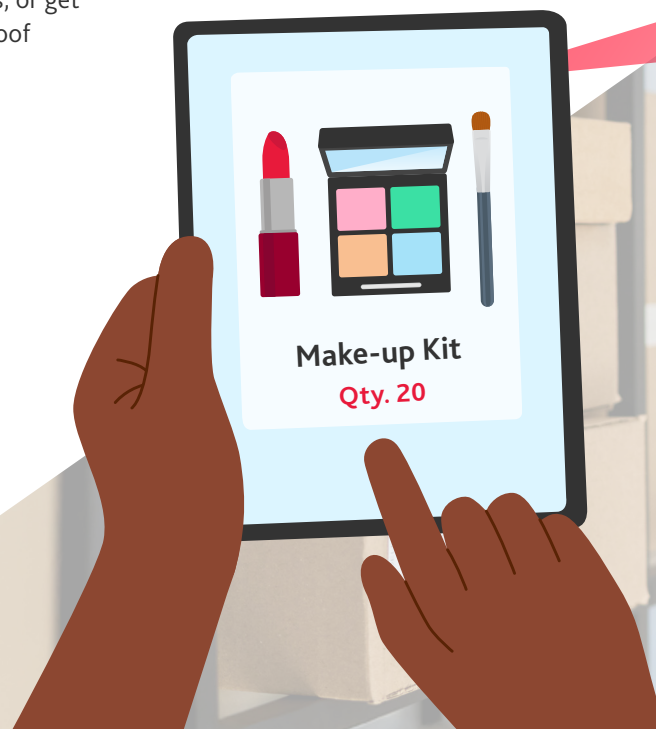
CH.4

AMFCs help retailers tackle growing industry challenges like expediting last-mile delivery, improving customer satisfaction, and carbon footprint reduction. They offer a means to achieve faster end-to-end fulfillment, helping smaller retailers compete with giants that have mastered same-day delivery. When venturing into the universe of micro-fulfillment, a paced approach will be key to success.

BDO professionals bring deep experience in carbon accounting and reporting standards, risk and resilience planning, and sustainability strategies to guide retailers through the transition to AMFC. Our teams can help you evaluate your complete fulfillment ecosystem, measure and record your sustainability efforts, and achieve supply-chain transparency across all touchpoints.

BDO also analyzes customer geographic distribution and purchasing patterns. By identifying where localized fulfillment will have the greatest impact, we help retailers set the foundation for automation that will enhance efficiency. From there, we build seamless automation plans that align with your existing supply chain operations and technology infrastructure integration plans.

Whether you're looking to choose the right location for your AMFC, integrate automation with existing operations, or get started with robotics, BDO is ready to help future-proof your business.



Are you ready to launch into the future of fulfillment?



ABOUT BDO'S RETAIL & CONSUMER PRODUCTS PRACTICE

BDO has been a valued business advisor to retail and consumer products companies for more than 100 years. The firm works with a wide variety of clients across the traditional retail, consumer product and ecommerce sectors, ranging from multinational Fortune 500 corporations to emerging businesses, on myriad accounting, tax and advisory issues.

BDO USA, P.C.

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