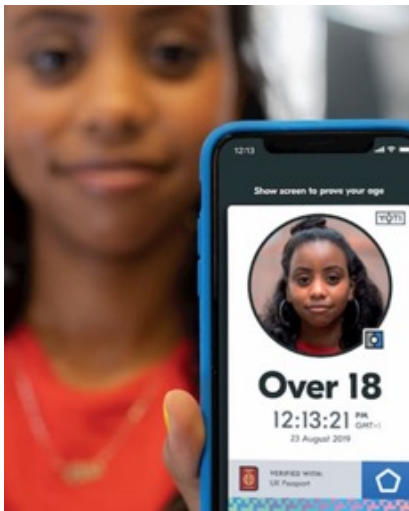




The grocery store of the **future**: How technology is evolving the store landscape

Automation and digital augmentation can boost profits and create better customer experiences



Click [here](#) to view the infographic





The grocery store of the future stands at the cusp of transformation

In this whitepaper, we explore how technology will redefine the grocery store experience.

Consumer habits and expectations are evolving due to technological advancements, changing demographics, and the growing demand for convenience and personalisation.

In recent years, inflation and labour shortages have impacted the grocery industry, raising prices and straining retailer-supplier relationships. Labour shortages have also led to increased wages, affecting both the cost of living and industry competitiveness.

This shift in consumer behaviour, alongside the need for profitability, has spurred innovation. Grocers are thus reimagining the store landscape by embracing cutting-edge digital solutions and integrating AI, automation, robotics, AR, and data analytics.

In the pages that follow, we explain the changes shaping the future of grocery stores and explore...

...which technologies are best suited to small, medium, and larger store formats, and the maturity of those technologies.

Let's take a look.



Small stores

The proximity of smaller stores to their customers provides retailers with a notable advantage over medium and large store formats. Even though small stores may be limited in the implementation of larger-scale technologies, there are still many opportunities that can be leveraged.

In-store order picking aggregation



Maturing

Convenience stores are often used to fulfill Q-commerce orders. However, each operator brings their own solution, often leaving the retailer with multiple systems and forms of technology to contend with. A modern, mature in-store picking solution can act as a Q-commerce “aggregator”. This means one solution can pick both for the retailer’s main online operation and for their Q-commerce partners. As a result, operators can pick orders from multiple order sources simultaneously at maximum efficiency.

Additionally, a single system reduces the training needed for store staff, and mastery of a single system can increase productivity. To minimise costs, modern picking solutions are app-based and could even be installed on an employee’s own smartphone.

Electronic Shelf Labels and digital signage



Mature

In the realm of Electronic Shelf Labels (ESLs) technology and digital signage, innovation is reshaping the grocery shopping experience. The benefits to the retailer are well known, and in today’s inflationary world, prices are changing at an unprecedented rate. Automating this process with ESLs means an entire network of stores can be updated at the touch of a button.

However, ESLs have evolved beyond price displays to become dynamic informational hubs. These smart labels can now showcase detailed product information, promotions, and even offer real-time inventory updates. The latest ESLs can also display more colours and graphics, allowing retailers and brands to showcase their identity.

For example, in a real-world grocery setting, a customer can scan an ESL with their smartphone to access recipe ideas and nutritional information. Additionally, digital signage is becoming more interactive and personalised, and grocery stores are using large screens to engage shoppers with targeted content.



Small stores



Grocery Lockers



Mature

Grocery lockers are a mature technology and are widely used across Scandinavia, where they are often the preferred last mile option for e-grocery customers.

Grocery lockers were first introduced in the UK over 10 years ago, with trials conducted by the likes of ASDA, Waitrose, and Sainsburys, but they were never widely adopted, despite the obvious cost savings to the retailer and benefits to the consumer. The UK has always been considered as a home delivery market; however, consumer and retailer attitudes are changing.

One use case that has been gaining attention recently is for grocery retailers to leverage their convenience store network as collection points. Consumers can order the full range of goods available online, and a larger store, dark store, or CFC acts as the fulfilment location and delivers the order to the customer's local convenience store for collection.

These lockers serve as secure automated pickup points for online orders, thus enhancing customer convenience and operational efficiency. Customers can place orders online, selecting the nearest convenience store with available lockers. Once their orders are ready, they receive a unique code or QR code and upon arrival at the store, then simply enter the code in the locker interface or via an app on their mobile phone, allowing them to collect their groceries at their convenience.

This approach minimizes waiting, offers 24/7 pickup flexibility, and reduces the need for in-store staff, ultimately optimizing the customer experience and reducing operational costs. Additionally, grocery lockers can help retailers cater to the demand for online shopping, providing a seamless and contactless shopping option that aligns with changing consumer preferences.

In the future, lockers will also be seen as a way to attract new customers. Consider, for example, a strategically placed locker in a business park or on the premises of a large company: the employer is offering a convenient service to its employees, and the retailer is gaining a new customer base.

Small stores

Automated collection point stores



Emerging

A pioneer in this field is JD.com (also known as Jingdong, a major Chinese e-commerce company), and in January 2022, they opened the first shop of its kind in Europe under the brand name “ochama”, meaning “omnichannel amazing”. The omnichannel model, which is for members only, allows shoppers the convenience of ordering a full range of food and non-food products through their app.

The orders are fulfilled from a larger warehouse and are delivered to a collection point, many of which are traditional collection points. However, they also operate four fully automated collection points with their own robotic stores, where the order is stored until the consumer collects it, at which point it is extracted by robotics. The big question is whether the technology is truly scalable.

Next generation self-checkouts



Maturing

In 2024, it will be 40 years since the self-checkout system was invented in the USA by David R. Humble, who was inspired by his experience standing in a long grocery checkout line. Self-checkouts are nothing new, but advancements in artificial intelligence can mean a faster and better customer experience while simultaneously increasing security.

One advancement gaining traction is **product recognition**, in which a camera identifies non-barcoded items such as produce. The technology is sensitive enough to determine one variety from another, helping to minimize shrinkage. AI algorithms can further help by detecting possible fraud, such as when a consumer tries to pass off an expensive item as a cheaper one. The system can flag suspicious activity for an operator, who then reviews the transaction.



A second innovation is age-estimation technology for **automated age verification**. There are over 150 items that require age verification in UK stores including alcohol, knives, nicotine, as well as crackers, party poppers and deodorants. All fall under different laws that require retailers to try to prevent underage sales. Yoti (a StrongPoint partner) first integrated facial age estimation technology into self checkouts 4 years ago. Since then, the technology has been trialed by retailers in the US, Estonia, Germany, Poland, the Czech Republic and the UK. Legislation currently prevents the use of the technology for sales of Alcohol in the UK, however in 2022 Asda, Morrisons, Tesco and Co-op, tested the technology as part of a Home Office regulatory sandbox, the aim of which was to trial digital age verification for the sale of alcohol.

During the trial there were no reported sales of underage customers purchasing age-restricted items and participating supermarkets confirmed they supported digital age verification and would welcome legislative change in this area. With 70% of people saying they would use facial age estimation when buying age-restricted goods at self-checkout, Yoti believes shoppers and retailers are ready to embrace this new technology.

Small stores

Autonomous Stores Maturing

In December 2017, Dutch supermarket chain Albert Heijn (owned by Ahold Delhaize), piloted its first “tap to go” store, based on its in-house technology, which uses a combination of digital onboarding, active Near Field Communication, smart shelves, and automated payments. Later, in 2019, they piloted “grab and go” technology from the American-based start-up AiFi (a StrongPoint partner).

Albert Heijn's 2017 pilot was marginally ahead of retail giant Amazon, who in 2018 made headlines when it opened its first checkout-free store in its hometown of Seattle. The Amazon Go store featured the company's “Just Walk Out” technology. Today, despite closing eight stores in the US in April 2023, there are more than 40 Amazon Go and Amazon Fresh locations across the US and the UK, and while Amazon currently has the largest number of checkout-free stores globally, other supermarket chains, including Tesco, ALDI and REWE, are experimenting with the technology.

In October 2021, the UK's largest supermarket chain, Tesco, opened its first checkout-free store in central London, following a trial at the company's headquarters. Tesco partnered with Israeli start-up Trigo to install its EasyOut technology at the “GetGo” store in High Holborn so that customers with the Tesco app could check-in to the store, pick up the groceries they need, and walk straight out, without visiting a checkout counter. A combination of cameras and weight sensors establish what customers have picked up and then charge them through the mobile app when they leave the store.



In January 2023, ALDI also opened a checkout-free store in the UK, using an AI-powered solution from AiFi. Like the other stores, ALDI's Shop&Go allows customers to complete their shopping without scanning a single product or having to go through a checkout counter. The store also uses facial age-estimation technology from Yoti to authorise the purchase of alcohol. (Staff were on hand to verify age for customers who opted not to use the system.)

In March 2023, German grocery retailer REWE announced its fourth Trigo-powered store, which opened in Cologne. Covering 600m², the supermarket is claimed to be the largest hybrid-autonomous store in the country. It is designed to enable customers to pay for their purchases either in the traditional way or autonomously. The new Pick&Go grocery store joined REWE's other three Trigo-powered stores in Cologne, Berlin, and Munich.

Trigo has also collaborated with ALDI Nord on an AI-powered cashier-less discount store in Utrecht, The Netherlands.

Small stores

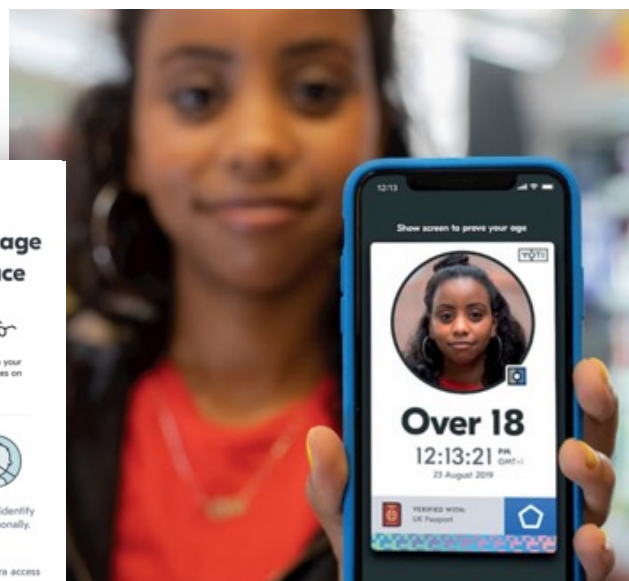
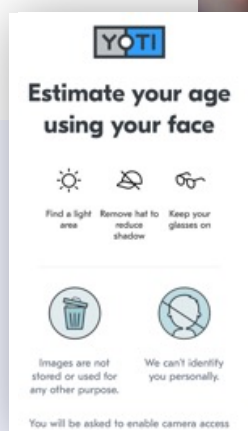
According to a report by strategic research and consulting firm RBR, titled “Global EPOS and Self-Checkout 2022”, there could be more than 12,000 stores with checkout-free technology operating around the world by 2027. If their prediction is accurate, this technology is set to grow exponentially, especially in the convenience store segment.

In the same year, as part of its 2022 Retail Industry Outlook, Deloitte surveyed retail executives it considers industry leaders. The majority, 55%, believe staff-free, cashier-less stores will be common in the next five years.

Despite the hype, several challenges must be overcome, aside from general customer acceptance and reliability. One challenge is how to dispense and minimise theft of high-value items such as razor blades, medicines, nicotine products, and cosmetics. In many grocery stores today, these items are routinely tagged, or the item is hung on a mechanism that prevents easy removal of more than one item at a time or requires employee assistance. None of these solutions are practical in autonomous stores.

One potential solution is to use click & collect points that utilize age verification technology. Such technology is mature, widely deployed in stores across Scandinavia, and avoids the need for human intervention. Items can be selected on a terminal, and once payment has been completed, the products can be collected from the collection point, where an age-verification check can be completed by AI technology such as that provided by Yoti.

Technology
can automate age
controls, saving
time and money for
self-service pickup



Whether the technology can be deployed in a given country depends on the legislation related to the items stored at the collection point. In the UK, digital age estimation can legally be used for all age-restricted goods except alcohol. For alcohol, the mandatory license conditions that a retailer must accept states that a responsible person must do a challenge-25 check, and anyone below 25 must prove their age with a physical ID document that has a holographic or ultraviolet mark, e.g., a passport, driving license, or PASS card. Neither age estimation nor a digital ID is acceptable until a change to the law is made. Retailers are pressuring the government for change, and the Home Office now has ministerial direction to review the law.

Small stores

Automated or Robotic Convenience Stores



Emerging

One step beyond the autonomous store format is the completely automated or robotic-enabled store. In the UK, in August 2023, a fully automated click & collect convenience store was trialled in a Manchester apartment block. The In:Five store, billed as the UK's first completely automated store, is on the ground floor of The Filaments in Salford and features a bank of lockers from which customers collect their groceries ordered on an app just a few minutes earlier. Behind the lockers, robotic arms pick items from shelves and place them in totes.

The store can stock around 1,500 SKUs, covering ambient, chilled, and fresh produce. The store is replenished from the customer-facing side of the wall, where totes of product are loaded into lockers and decanted by the robot onto the out-of-sight shelves.

Reshelling Robotics



Emerging

Robots are increasingly being employed to streamline the process of replenishing store shelves in retail environments. They can work during non-operational hours or alongside store staff, ensuring that shelves are consistently well-stocked. Whether they are suitable for a small store really depends on the space available.

Japan-based FamilyMart sees the potential for the convenience store market, and in 2022 they announced a partnership with Tokyo-based robotics company Telexistence Inc. to deploy a fleet of robotic arms tasked solely with reshelling the minimarts' refrigerated products at 300 of their 16,000 locations. They claim the robots can operate autonomously up to 98% of the time, with minimal human intervention.



At StrongPoint, we have been exploring use cases with humanoid robotics company 1X Technologies, whom we invested in and formed a strategic partnership with back in 2021. They recently announced an investment by OpenAI, and we see great potential in both retail and logistics.

Medium stores



Medium-sized stores can benefit from much of the technology already described in this white paper, but the slightly larger size means these stores are suitable for technology that requires more space or volume to achieve a higher ROI. Here we explain which technologies might be optimal.

SaaS-based Order Picking



Mature

UK retailers have been fulfilling grocery orders in-store for over two decades, and little has changed since. Many systems still in use today are based on traditional on-premises warehouse management system (WMS) technology. On the other hand, modern cloud-native solutions can greatly improve productivity and increase pick rates to 250–300 units per hour. The technology also comes with all the benefits of an SaaS solution, leading to significant cost savings for the retailer. The software is typically coupled with purpose-designed picking trolleys, often with integrated scales, and the pickers often use rugged hands-free hardware devices such as wrist-mounted-scanners and ring scanners.

Pick By Light



Mature

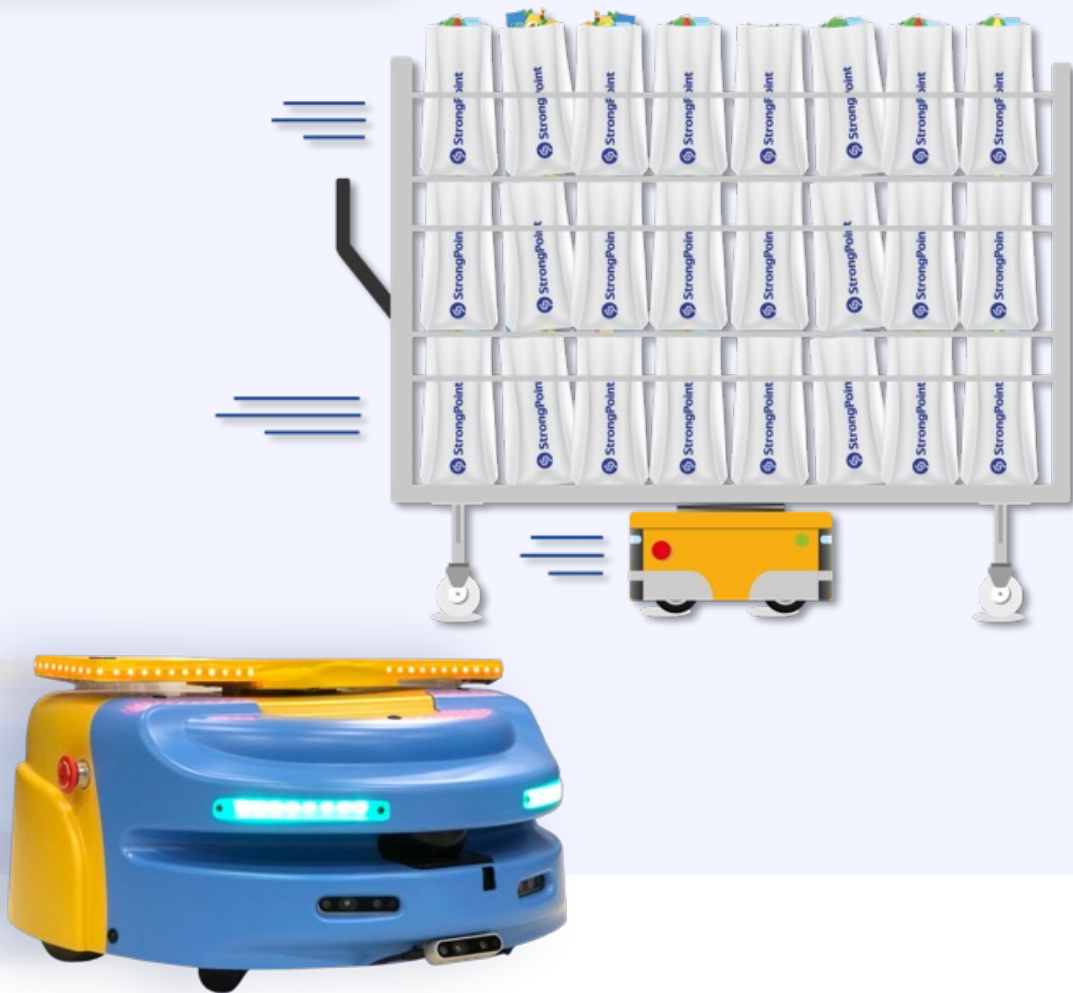
ESL systems such as those from Pricer (a StrongPoint partner) can be integrated with in-store picking solutions to enable “Pick by Light”. The ESLs contain an LED light that can be made to flash in different colours and/or with different patterns.

When an in-store picker receives their instruction to pick an item, the ESL for the item can be made to flash, reducing search time. This is especially useful in sections where many items look similar.

The integration can increase the speed of picking by ~10%, raising the ROI of implementing both the picking solution and ESLs. If this is something you are considering introducing, we would recommend asking your supplier to provide a proof of concept, as we have seen a significant difference in the response times between ESLs, depending on the manufacturer’s technology. The best suppliers will respond instantly.



Medium stores



Autonomous Mobile Robots (AMRs) Emerging

AMRs within warehouses can be considered a mature technology, but their use in-store is only just emerging. AMRs have many use cases within a medium- to large-sized store, from picking to replenishment, click & collect, and customer services. Dutch hypermarket chain Bilka, which is part of Salling Group, are thought to be the first in the world to have successfully trialled the technology in-store as part of their click & collect operation. They have been working with Dutch start-up Coalescent Mobile Robotics (a StrongPoint partner) and have been running a fleet of AMRs in-store since 2022.

In close cooperation with BILKA, Coalescent Mobile Robotics has developed a sociable, safe, and human-friendly robot for the conditions and needs of a supermarket.

We believe AMRs have multiple use cases for e-commerce order picking. According to our own research, an e-grocery picker can spend up to 58% of their time walking. Firstly, the AMR can operate in “fetch” mode so they can bring trolleys to pickers or return them to the back of the store with picked orders. They can also be used to “follow” the picker, who can remain hands-free, thereby reducing the overall walking needed.

Not all AMRs are created equal. When we researched the market, it was clear that many providers were either unwilling to operate in stores, lacked the logic to operate safely around shoppers, or had weight capacities that made them unsuitable for the job.

Medium stores

Augmented reality (AR) apps – Customer Focussed



Emerging

These apps have, and will continue to, revolutionize the grocery store shopping experience, and there are already several real-world examples in use in the UK.

An early example of the technology appeared in 2017, when Ikea launched its Place app, which allowed consumers to virtually “place” items of furniture in their home. The furniture scales automatically in the app according to the room’s dimensions.



Marks & Spencer launched an AR app in 2022 that helps customers navigate supermarkets more efficiently. The app provides digital maps of their stores, helping shoppers locate products and find their way more easily.



Tesco took this a step further and added gamification when integrating AR features into its Tesco Discover shopping app. Customers were able to participate in the “Big Night In” family quiz game, a feature that encouraged customers to scan physical products to unlock the game, in which they could take part in challenges and earn rewards. They were also able to share their achievements with friends and family on social media.

Other brands have also got in on the act. A notable example is the 19 Crimes wine-marketing campaign, which incorporated AR technology and gamification to offer a unique and immersive experience for their customers. Their “Living Wine Labels” augmented-reality application enabled customers to witness the men and women featured on the bottles come to life and share their stories in their own words, motivating customers to collect all 19 bottles of wine.

Other apps focus on helping consumers visualise items on themselves. A notable example includes ASOS’s Virtual Try-On. The popular online fashion retailer collaborated with Zeekit to offer an AR feature that enables customers to virtually try on clothing items. This technology allows shoppers to see how garments would look on them before making a purchase.

Another example similar to the Ikea app comes from UK retailer Breville’s. Their app allows customers to visualize how kitchen appliances would fit into and look in their homes.

Overall, AR apps not only simplify the shopping process but also enhance customer engagement and satisfaction by providing a personalized and informative shopping journey, ultimately benefiting both customers and retailers.

Larger grocery stores can invest in data analytics and customer relationship management systems to personalize marketing and shopping experiences. Smaller stores might lack the data volume to make such systems cost-effective.

Medium stores



Augmented reality (AR) apps – Employee Focussed Emerging

Marks & Spencer uses an AR app to assist employees. The app pinpoints the user's location in the store and generates a digital map, helping employees find products and provide better assistance to customers.

Augmented reality can be used by employees to visualize and set-up store shelves more efficiently. In this regard, AR apps can superimpose digital planograms onto physical store aisles, helping employees arrange products according to plan, without the need for printouts.

AR apps can also be used in employee training. They can provide step-by-step visual instructions for tasks like restocking shelves or handling perishable goods, thus enhancing the learning process and reducing errors.

One to watch is augmented reality picking. By using AR glasses or smartphone apps, store employees can view a digital overlay atop a real-world store environment, guiding them to the exact location of each item on their pick list. This technology enhances efficiency by reducing the time spent looking for products, minimizing errors in item selection, and even providing additional information such as product details and pricing.

Automated Customer Service Desks Emerging

A common request from retailers is how can they remove labour from the customer service desk. These desks often serve several functions, including click & collect, returns processing, general enquiries, and tobacco and lottery sales. The challenge lies in there being no single technology to replace all these elements. Some are mature, and others are still in development. It is the combination of multiple technologies that is an emerging trend.

Medium stores

Potential technological solutions to automate the customer service desk include:



Click & Collect

- Temperature-controlled lockers: widely used in Scandinavia, grocery lockers can eliminate the need for a staffed solution.
- Drive-thrus: camera-based technology can read the customer's licence plate and alert ecommerce staff, thereby reducing interaction at the customer service desk and eliminating the labour needed to bring the order from the back of store to the customer service desk.



Returns

- Self-service kiosks: many retailers have implemented self-service kiosks that allow customers to complete their returns without staff assistance. These kiosks often feature touchscreens and barcode scanners for quick processing.
- Automated returns lockers: some stores have installed lockers in which customers can deposit their return items. These lockers are equipped with technology to receive and store returned products securely.



General enquiries

- AI-enabled terminals: these can handle many typical enquiries.
- Autonomous robots: by coupling terminal technology with the mobility of the employee, ARs can also escort the customer to specific products or areas of the store.



Tobacco & Lottery Sales

- Collection points: terminals can be deployed for selection and payment, and the goods can be collected from automated collection points (legislation permitting).

Hybrid Checkouts



Maturing

Hybrid checkouts, which combine self-checkout and traditional staffed checkout options, are continually evolving to enhance the shopping experience. Demand for self-checkouts versus staffed checkouts changes throughout the day.

Checkouts that operate in both self-checkout and staffed checkout modes provide stores with the ultimate flexibility. For both environmental and cost reasons, it's becoming more common to convert existing traditional checkouts into hybrid models by adding a swivelling checkout unit, enabling the checkout to either face the operator or the consumer, with software optimised for both options.

StrongPoint has been rolling out such technology for UK retailers since 2022.



Large stores



Large grocery stores have the advantage of space and resources, allowing them to implement automation technologies that may not be feasible for smaller stores. Some technology is suitable for large grocery stores but may be unsuitable for smaller ones due to space constraints or the inability to achieve an ROI.

Micro-fulfilment Maturing

Integrating a micro-fulfilment centre (MFC) into an existing store allows you to make the most efficient use of available space. Retail spaces often offer valuable square footage that can be repurposed for order fulfilment. By converting part of a larger store into an MFC, retailers can utilize existing infrastructure while still accommodating in-store customers. Such integration of fulfilment operations with retail space minimizes the need for additional warehouse or storage facilities. An MFC is so flexible that it can be built in a space of almost any size and can store items at three temperature zones: ambient, chilled, and frozen. StrongPoint is an AutoStore and is currently implementing the world's first three-temperature automated storage and retrieval system, which can also be used to store picked orders until loading for delivery or extraction by a customer at a specialized port.



If you would like to learn more about MFC's within a store we would recommend you read another white paper we have published:

click [here](#) to find out more



In-store Robotics

Robots in grocery stores have diverse applications. Some are designed for cleaning and others for inventory management, including scanning shelves, ensuring items are in stock, and even notifying store employees when restocking is needed. Others focus on customer interaction and service.

Cleaning Robots Maturing

Industrial floor-cleaning robots date back to the late 1990s, but more recent advancements in artificial intelligence and connectivity means they are now suitable to be deployed in a store environment among staff and customers. Like the challenges AMRs have had to overcome, robots need to navigate complex and constantly changing store environments. The covid-19 pandemic gave the industry a much-needed boost, and they have now become an innovative solution in enhancing cleanliness and hygiene in grocery stores.

Smaller stores can benefit from the time-saving aspect of these robots, as they can operate during off-hours, ensuring the store is clean and presentable for customers during business hours. That being said, they are best suited to larger store formats.

ASDA, a UK supermarket, made headlines in 2020 by becoming the first UK grocery retailer to deploy robots that autonomously navigate store aisles to efficiently clean floors. These robots are equipped with advanced sensors and algorithms that enable them to detect obstacles and avoid customers.

Beyond ASDA, various other grocery retailers have also shown interest in trialling or deploying robots, reflecting the maturity and acceptance of this technology in the retail sector. These robots not only improve the shopping experience by ensuring cleanliness but also free up staff for more customer-centric tasks.

Customer Service Assistance and Guidance Robots Maturing

The concept of using autonomous robots in stores for customer assistance and guidance emerged in the late 2000s. These early experiments focused on the use of robots for interacting with customers, providing information, and guiding them to specific store locations.

Several retailers and technology companies introduced pioneering examples of robotic guides. For instance, robots like NAO by Aldebaran (introduced in 2008) and Pepper by SoftBank (2014) were among the first to interact with customers in-store, answer questions and offering recommendations. A key challenge was making these robotic guides adaptable to different store layouts and languages.

With advancements in artificial intelligence and machine learning, robotic guides have become more sophisticated. They can analyse customer behaviour, offer personalized recommendations, and even learn from customer interactions to improve their assistance. The use of autonomous robotic guides in stores continues to evolve, with more retailers and technology companies exploring their application. These robots have the potential to offer a unique and interactive shopping experience.

In-store Robotics



Inventory management robots



Maturing

The earliest trials of inventory management robots in grocery stores date back to the early 2010s. In the past five years, there has been a proliferation of trials by multiple vendors.

One of the most famous robots is Marty, provided by Badger Technologies. Its fame is mainly due to a viral video of its escape from a giant grocery store in the US, where it was seen patrolling the car park before it was escorted back to the store.

In the UK in 2015, Tesco trialled mapping and analytics robots from California-based company RFspot in five of its stores' clothing departments. This robot was based on passive RFID technology.

The latest robots use cameras and AI-powered image recognition to identify products and document out-of-stock and misplaced items. StrongPoint has partnered with Shelfiepro to supply their robot (shown here). It is capable of both inventory management and customer assistance, and StrongPoint currently is overseeing trials with retailers in Sweden.

Inventory Management Drones



Emerging

Ingka, which manages IKEA operations in 31 markets (representing about 90% of the chain's retail sales) first trialled the use of drones for in-store inventory management in 2021. Since then, they have been gradually expanding, and in March 2021 they announced a milestone: 100 drones across 16 locations in Belgium, Croatia, Slovenia, Germany, Italy, the Netherlands, and Switzerland. This, they claim, makes them the first retailer to successfully deploy drones at scale to manage inventory in-store. The drones operate in off hours.

The use of drones within Ikea makes sense, as the stores are more akin to warehouses, with high racking and shelving. Ground-based inventory-management robots would struggle to make accurate assessments in such an environment. It will be interesting to see if this technology transfers to the grocery store!

Last Mile Automation

When it comes to last mile, a lot of automation possibilities are making headlines. From drones, to driverless vehicles, to miniature driving robots capable of delivering a single order, let's explore some of these technologies and their relative maturities.

Delivery Drones Emerging

PWC estimates that drone deliveries are set to be worth £45 billion in the UK alone by 2030 and are already a reality in much of Asia. Chinese companies like Alibaba and JD.com used drones to deliver items to shoppers as early as 2017, and Alphabet, the parent company of Google, offers drone delivery via its subsidiary Wing in Australia, where it announced its 200,000th delivery in March 2023.

The UK has been catching up fast. Tesco, with operator Manna, launched a rapid drone delivery service in County Galway, Ireland, in October 2020, delivering items within a two-kilometer range of its store. Since it commenced trials in 2020, their supplier has developed aviation-grade drones that fly at 80km/h and deliver goods, including groceries, takeaways, and medicines, within a three-kilometer radius in under three minutes. In May 2023, Manna announced plans to deliver Tesco groceries and Subway sandwiches from a new facility.

The UK's first Royal Mail drone delivery service also launched in Orkney this year (2023). The industry is set to go from strength to strength with support from the UK government, which unveiled plans in 2022 to build a 164-mile automated drone superhighway by mid-2024. Called the Skyway project, it will connect the airspace between Cambridge, Oxford, Rugby, Milton Keynes, and Coventry.

The technology exists and has proved its value. The limitations are now mainly regulatory.

Driverless Vehicles Maturing

There is significant interest in the application of autonomous vehicles in the grocery industry, with various trials taking place globally.

In the UK, Ocado began a relationship with UK-based Oxbotica (Now Oxa), who in 2017 completed the UK's first trial over two weeks using an early prototype vehicle for autonomous deliveries in Greenwich, London. As part of the same trials in 2017, Ocado sent a self-driving truck through the streets of Woolwich in South-East London, the UK's first trial of a self-driving delivery vehicle. In 2021, they invested £10M in the technology.

In 2021, UK-based start-up Wayve, which has been actively testing autonomous vehicles on public UK roads since early 2018, announced commercial partnerships with both Ocado Group and ASDA to trial AV technology on last-mile urban delivery routes in London.

Last Mile Automation

In April 2023, ASDA commenced the UK's largest autonomous grocery home shopping delivery trial with Wayve, which is planned to last one year.

The implementation of autonomous grocery deliveries is likely to continue evolving and expanding in the coming years. While there may still be challenges and regulatory considerations to address, the growing interest and investment in autonomous delivery technologies suggest that they are on track to become a mainstream reality in the near future.

Last Mile Delivery Robots



Maturing

The robot delivery service developed by Starship Technologies is the most notable UK example. Before operating commercially, the service was tested in over 100 cities and 20 countries around the world. The company now operates in the United States, the United Kingdom, Germany, Finland, and Estonia.

It first launched in the UK in 2018 and has been used by both Tesco and Co-op. In May 2023, Starship Technologies announced that it will be pausing deliveries from Tesco Express stores as it moves to focus on working with Booker (part of the Tesco Group), who work with retailers such as Londis, Budgens, and Premier.

Co-op will continue with the service, and its delivery robots are already in operation from group stores in Manchester, Milton Keynes, Northampton, Bedford, Cambourne, Cambridge, and Leeds. Orders are made through Starship's food delivery app, with groceries picked fresh in local Co-op stores and delivered to customers via its electrically powered robots.

The robots ride on the pavement at a pedestrian speed for relatively short distances and can carry up to 20 pounds (9.1 kg). They can be controlled remotely if autonomous operation fails, and once the robot makes the delivery, the user receives an alert and can unlock the robot through the app (with their identity verified through biometric authentication).

In the UK, home delivery remains the most selected option, despite the high cost to retailers. Labour shortages and inflation are driving retailers to invest in and trial autonomous and robotic last mile options. In other countries, click & collect, especially from grocery lockers, is the preferred option, and grocers are breaking even or profiting in grocery e-commerce.

In our experience, grocery lockers succeed when a retailer deploys them in significant enough numbers. They should be deployed close to the store, where they are visible, and not in the far corner of the car park.

Just as with the introduction of any new technology, such as self-checkout, the retailer must provide consumer education, consumer assistance, marketing, and incentives. It is well known from the carrier delivery market that when consumers are provided with choice at the point of order, they will often select the greener option (with the right messaging). Highlighting the environmental impact of a delivery versus a locker is sometimes all that is needed.

For real industry-wide adoption across multiple retailers, legislative change may be needed. Consider how consumer behaviour might shift away from home delivery if an additional charge were introduced for home delivery, similar to a carrier bag charge.

Why grocery retailers **love** our lockers



Temperature Zones

4 temperature zones – fulfill orders from any SKU variety



Fast ROI

Estimate <1 USD cost per order, excluding staff efficiency savings



No waiting

Load whilst customers unload, no waiting to load new orders



Remote Management

Diagnostics and control available via cloud



Management App

Contactless loading and push notifications



Remote Locking

Prevents customer from accessing groceries in case of temperature irregularities



Fast Loading

On average takes <1 min to load an order



Plug & Play

instant IT infrastructure integration



Rugged & Durable

5+ years deployed in temperature zones of -25°C/-13°F to 40°C/104°F

Why grocery customers **love** our lockers



Smartphone Access

Customer can open doors via smartphone weblink – for contactless pickup



Fast Pick Up

The average customer takes <1 min to pick-up a full order



AI-Age verification

Allows for 24/7 pickup of age-controlled items



Locker Reservation

Allow disabled/mobility restricted customers to reserve lower compartments



Flashing doors

Each compartment flashes makes it easier and faster to get order



Big Compartments

up to almost 200 litres of storage per compartment fits almost every order

Data and Data Analytics

The use of data and data analytics in the grocery industry dates back several decades, but it has evolved significantly with the advancement of technology in recent years.

In the 1970s and 1980s, grocery retailers started using point-of-sale systems to capture transaction data. This allowed them to track sales, inventory, and customer purchasing behaviour.

In the 1990s, grocery chains like Tesco in the UK and Kroger in the US introduced customer loyalty programs. These programs collected data on customers' purchases and preferences, enabling retailers to personalize offers and discounts.

With the rise of the internet in the late 1990s and early 2000s, grocery retailers began collecting data from online shopping platforms. This data included customer browsing habits and purchase history.

Over the past two decades, advancements in data analytics and big data technologies have transformed the way grocery retailers use data.

Data analytics is now poised to bring a profound transformation to the grocery industry. With the advent of big data and advanced analytics tools, grocers are now harnessing the power of data to gain deeper insights into consumer behaviour, preferences, and trends like never before. These insights enable them to make data-driven decisions, optimize inventory management, and tailor product offerings to meet evolving customer demands. For instance, AI-based data analytics can provide grocers with invaluable information about buyers' meal preferences, food allergies, and motivations for purchasing items, allowing for highly personalized and targeted marketing strategies.

Moreover, data analytics empowers grocers to enhance supply chain efficiency. Predictive analytics can forecast demand patterns, enabling better inventory management, and reducing food wastage. By analysing various data sources, grocers can also identify cost-saving opportunities and improve pricing strategies, thereby benefiting both retailers and consumers. Furthermore, data-driven insights enable grocers to optimize the layout of their stores and streamline the shopping experience, creating a more customer-centric environment.

As technology continues to advance, data analytics is set to be at the forefront of the grocery industry's evolution, enhancing operational efficiency, customer satisfaction, and overall competitiveness.

Areas that may see the greatest advances in the coming years include:

Personalized Shopping Experiences: Grocers will increasingly leverage data to provide highly personalized shopping experiences. This includes tailoring product recommendations, discounts, and promotions to individual customer preferences. By analysing purchase histories and real-time data, grocers will offer more relevant and engaging interactions, both in-store and online.

Supply Chain Optimization: Data analytics will play a pivotal role in optimizing supply chains. Grocers will use data to forecast demand more accurately, reduce food waste, and enhance inventory management. Predictive analytics will enable them to make informed decisions about procurement and distribution, ensuring products are available when and where customers need them.

Sustainability and Ethical Sourcing: Consumers are becoming increasingly conscious of sustainability and ethical sourcing. Grocers will use data to trace the origins of products, ensuring transparency in the supply chain. This will also involve tracking the environmental impact of products and making data-driven decisions to reduce carbon footprints, ultimately meeting the growing demand for eco-friendly products.

These predictions highlight the evolving role of data in the grocery industry, focusing on personalization, efficiency, and ethical considerations. Grocers who seek to maintain their share will harness data to meet the ever-changing demands of their customers and the market.

How will technology shape the retail workforce

According to the British Retail Consortium, around 30% of all jobs in the UK face a substantial risk of automation. In contrast, the risk of automation is significantly higher, at 42%, for jobs in the wholesale and retail sectors. The BRC's projection indicates that the retail job market will experience a decline of 900,000 positions by 2025, with automation accounting for most of these losses, estimated at 370,000 jobs.

The character of numerous retail occupations is expected to undergo transformation, but not every task associated with a specific job is easily automatable. As a result, most jobs will not be entirely phased out. Instead, we can anticipate the emergence of higher-value roles that demand a human touch, and more employees will be focused on customer service, upselling, and cross-selling.

Nevertheless, it's crucial to keep in mind that the mere possibility of automating a job does not guarantee its swift or complete adoption. Even if a technological solution is feasible, its implementation may be hindered by higher costs when compared to human labour, which could limit its adoption.





Conclusion

The grocery industry is on the verge of a technological revolution, and the store of the future holds exciting possibilities and will present profound transformation.

Consumers, driven by their evolving preferences and the allure of convenience and personalization, are at the forefront of this transformation, which is being accelerated by the need to maintain profitability and market share.

We have witnessed the infusion of cutting-edge digital solutions, the strategic use of data analytics, and the incorporation of artificial intelligence, automation, and augmented reality.

Grocers have demonstrated their adaptability and innovation in leveraging these technologies to redefine the shopping experience.

With advancements in technology, it is inevitable that the workplace will evolve and new and exciting opportunities will be created. Some roles will be eliminated, and some will be redefined.

The right choice of technology for small, medium, and large store formats will be essential, and the maturity of these technologies will dictate success. The intersection of technology and consumer behaviour will shape the grocery landscape in remarkable ways.

The minds at StrongPoint are your guides on this journey. We can advise, supply, implement, and install many of the technologies we've discussed.

We are constantly tracking emerging technologies, which we either develop ourselves, invest in, or partner with. We welcome the opportunity to learn about your business challenges and to determine how technology can help you overcome them.



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