



Industry in Focus

Frictionless retail – The future of shopping

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pwc





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1. Executive summary: The way we shop is changing at a greater rate than ever before

Consumer demands are ever changing. Never has the need for convenience and low cost been higher, with 41% of consumers willing to pay more for a product if they can purchase them more quickly and conveniently. Inversely, consumers' appetite to spend has changed as a result of increased inflation.

On average **31%** of consumers surveyed expect to spend more on their grocery shops in the next 12 months, presenting an opportunity for those retailers who can drive cost out of their operations, and provide optimised pricing, capabilities which can be enabled by frictionless retail solutions.

A 'frictionless' store enables customers to enter, pick up their products, and simply walk out without the need to scan, queue, or check out. Computer vision AI technology is at the core of the proposition, to identify which products the customer has selected and charge them accordingly using a variety of methods from mobile apps through to biometrics.

But why when **1 in 2** shoppers will actively switch to frictionless retail experiences are these stores taking so long to take off?

To understand these trends better and the application of Computer Vision AI technology to our shopping experience, PwC Retail & Consumer Consulting surveyed a representative sample of 5,000 UK adults on their perception, willingness to shop and influencing factors of frictionless retail. This survey was commissioned by PwC Retail & Consumer Consulting and makes reference to wider PwC research such as consumer sentiment as well as external sources such as IBISWorld reports.



Within this report we outline how the technology works, where we feel the market is going and our key considerations and next steps for retailers when exploring frictionless retail opportunities. Our findings conclude a clear set of considerations focused on driving the uptake of this technology by customers, and providing a basis for strategy and deployment for retailers launching their first frictionless stores.



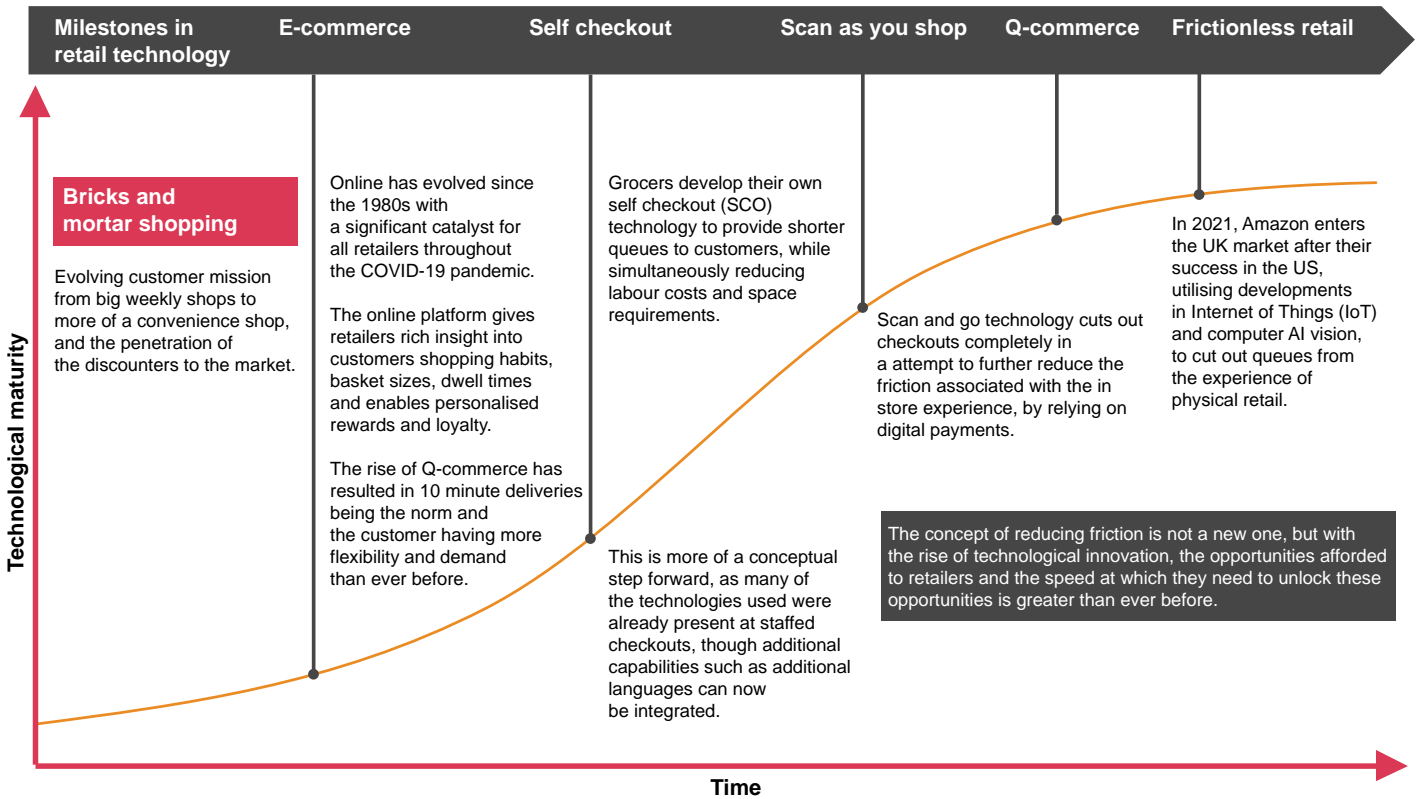
2. Retail technology: The evolution of onsite AI powered technologies

The concept of reducing friction within the retail experience is not new. Consumers consistently place convenience as a key factor in deciding where to shop, with 43% of all consumers saying that they would pay more for greater convenience ([PwC experience is everything: Here's how to get it right](#)). However, with the rise of technological innovation, the opportunities afforded to retailers and the speed at which they need to unlock these opportunities is greater than ever before.

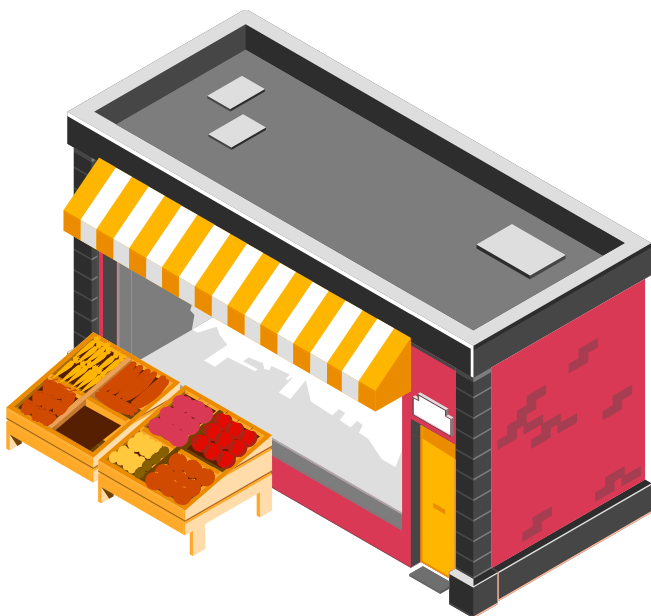
Retailers need to remain vigilant, adaptable and agile. New players and propositions within the retail market don't necessarily make existing concepts redundant, and established retailers can co-exist alongside new players. It is important to understand that users have a variety of constantly changing needs, and not one solution is simultaneously able to satisfy them all. Instead, technologies satisfy their different niches, and retailers need to fully understand the benefits of each channel and how best to integrate these to create a seamless and consistent experience for the customer.

Frictionless stores which use computer vision based AI, and remove the need for a checkout have increased significantly over the past few years. This proposition enables an easier method of product selection and payment to the customer, whilst also providing retailers with accurate and real time data to manage product performance and supply. Retailers need to support customers to integrate these new stores into their routines. A clear communication and engagement strategy is also required, to mitigate current concerns with the safety of the data and the functionality of the technology.





Bricks and mortar



Physical locations are the traditional channel for retail. They allow customers to interact with staff, products and other customers, which may be more appealing to different demographics, such as those with limited social interaction, or more appropriate for certain product types, such as fashion where experience may be more important than cost.

Over time, many customers have shifted their focus to prioritise convenience and price. This has led to a shift from big weekly shops to smaller convenience shops and the penetration of the discounters to the market.

For example, of the **5,000** UK customers we surveyed, **47%** will go to a big shop once a week and only **30%** will go multiple times a week. However, when we then look at those attending small convenience stores it drops to **30%** will shop there once a week and **30%** will go multiple times in the week.

E-commerce

Online shopping allows customers to access retail environments without the need to go to a physical location. It has evolved since the 1980s, as more people have gained the infrastructure and skills to navigate the internet and is widely used by a range of consumers, especially as the COVID-19 pandemic made physical locations less attractive.

Online platforms give a number of benefits to both retailers and customers. It makes retail more accessible to those with limited mobility, allows customers to shop at more convenient hours and makes it simpler to compare offerings at various retailers. Retailers, in turn, receive rich insight into customers shopping habits, basket sizes, dwell times and enable personalised rewards and loyalty.



Self checkout



Self checkouts (SCO) allow customers to pay without the need for a cashier. This concept wasn't entirely new as vending machines have been commonplace for decades. This was more of a conceptual step forward, as many of the technologies used were already present at staffed checkouts, though additional capabilities such as additional languages can now be integrated. The rise of contactless payments has made this form of checkout even more efficient and more recent developments are in progress to increase the efficacy of these systems to limit theft or misuse. Grocers developed their own SCO technology to provide shorter queues to customers, while simultaneously reducing labour costs and space requirements. They have now become commonplace, even outside of grocery stores, with them being implemented in places such as airports and fast food restaurants.

Self scanning

Self scanning technology, also known as 'Scan as you Shop' or 'Scan & Go', cuts out checkouts completely in an attempt to further reduce the friction associated with the in-store experience. In theory, this eliminates queues for consumers and saves valuable floor space for retailers. However, self scanning may not be a solution for everyone, as some consumers may prefer the interaction with staff at checkouts or may prefer to pay for their shopping with cash, as this technology relies on digital payments.



Q-commerce

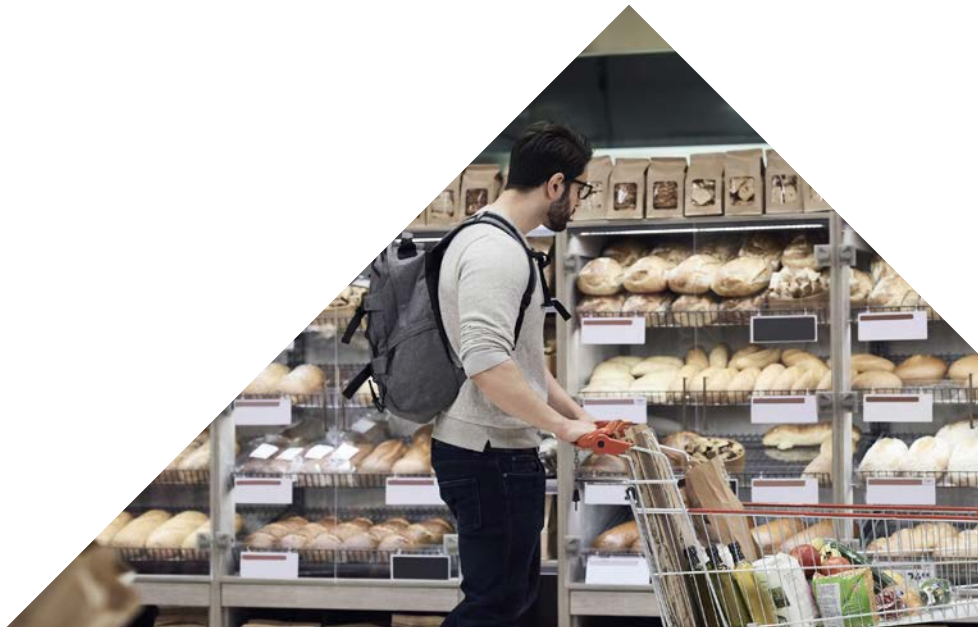
Quick-commerce is an evolution of e-commerce, enabled by advanced logistics, with the difference being the time between ordering a product and having it delivered at your doorstep. The rise of Q-commerce has resulted in 10 minute deliveries being possible for a wide range of products and the customer having more flexibility than ever before. This further supports customers' desire for convenience and is a gap in the market that new businesses are happy to exploit, though it is still only feasible in high-density urban areas. Customers are happy to pay a premium for the increased speeds that this technology provides, however that means that there is still room for 'traditional' e-commerce with lower costs and longer delivery times.



Frictionless retail

Frictionless retail is the latest development in physical stores and utilises the recent progress in IoT and computer vision AI, to create a grab and go experience, completely without queues. It differentiates itself from self scanning technology as cameras in the store are able to accurately track the items you add to your basket and bill your account as you exit the store.

The technology entered the UK market in 2021, after proving viable in the US, and is the most convenient iteration of the physical store for customers and opens a number of opportunities for retailers.



3. Frictionless retail: Its impact on retailers and customers

A frictionless store enables customers to enter, pick up their products and simply walk out without the need to scan, queue, or check out. AI technology is at the core of the proposition, to identify which products the customer has selected and charges them accordingly using a variety of methods.

The most frequent methods include:

- Mobile app – customers would download the app, register with the retailer and then scan a QR code as they enter the store.
- Debit / credit card – customers would scan / tap their debit or credit card as they enter the store.
- Biometrics – customers would scan their fingerprint or palm as they enter the store.

Customers enter with their credit card

They shop in your store

They are good to go without visiting the checkout





Frictionless retail and the use of AI in checkout free stores has some significant opportunities that will revolutionise the way customers shop and the way retailers operate, to deliver cost efficiencies, drive market growth via range performance and replenishment and ultimately increase customer satisfaction.

For retailers, the opportunity to gather a wealth of relevant insights and data, streamline workforces, reduce their waste, and improve their profit margin is significant. The camera software and other technology will help gather a wealth of relevant data and insights that can be used to determine the strategy for store format, product range and display, and promotional activity. Computer vision will also be able to support predictive stock management by identifying low stock products. Linking this data with external insights such as weather will improve shelf availability and customer offer. Through improved shelf availability, there will also be reduced waste as the right products will be on the right shelves at the right time. The reduced waste will help improve cost efficiencies, whilst helping them achieve their environmental ambitions by reducing the amount of waste that ends up at landfill.

Frictionless technology is not replacing employees, but rather streamlining the workforce to focus on value-adding activities enabled through the real-time insights, including but not limited to, ongoing management of the stock, range performance, and promotion. Additionally, with **41%** of customers willing to pay more for a product if they can purchase them more quickly and conveniently, retailers have the opportunity to improve their average basket value (ABV) and profit margin.

The opportunity for frictionless technology growth extends beyond just grocery retailers. Other industries such as stadiums, venues, amusement parks and hospitals could also use AI and the frictionless concept to improve their customer experience. The likes of Leicester

City Football Club have already started implementing frictionless technology.

For customers, checkout free stores provide them a quick, effortless, and convenient shopping experience as they no longer need to queue and spend time at checkout. Customers will also benefit from the improved product ranges, stock level product mix, and promotions. Through customer profiling and use of data, customers can also receive real-time personalised rewards at impactful moments in store. As retailers understand customer behaviours and journeys better, consumers can also benefit from the improved store layouts that are easier to navigate.

Implementing frictionless stores will not go without its challenges. Firstly, the continuous fear that frictionless technology will replace jobs is causing hesitation towards the adoption of frictionless stores. Secondly, whilst there is substantial consumer demand for these checkout free stores, our survey also shows **33%** responding say they would be 'quite unlikely' or 'very unlikely' to shop a frictionless experience in a large format store (this falling to **27%** for smaller convenience stores). This presents a significant challenge. If a frictionless experience was to become the only in-store option available, a third of current shoppers could potentially be driven away from the store and into competing retailers. This scale of risk is simply too great to ignore and needs addressing from the outset. We should remain mindful that with all the promise of digital technology, the UK grocery shopper is incredibly diverse and covers almost every end of the demographic spectrum. Therefore whilst a one size fits all approach may become the norm in the longer term, the short to mid term must consider the shopper needs and help them embrace and successfully adopt the new shopping experience.

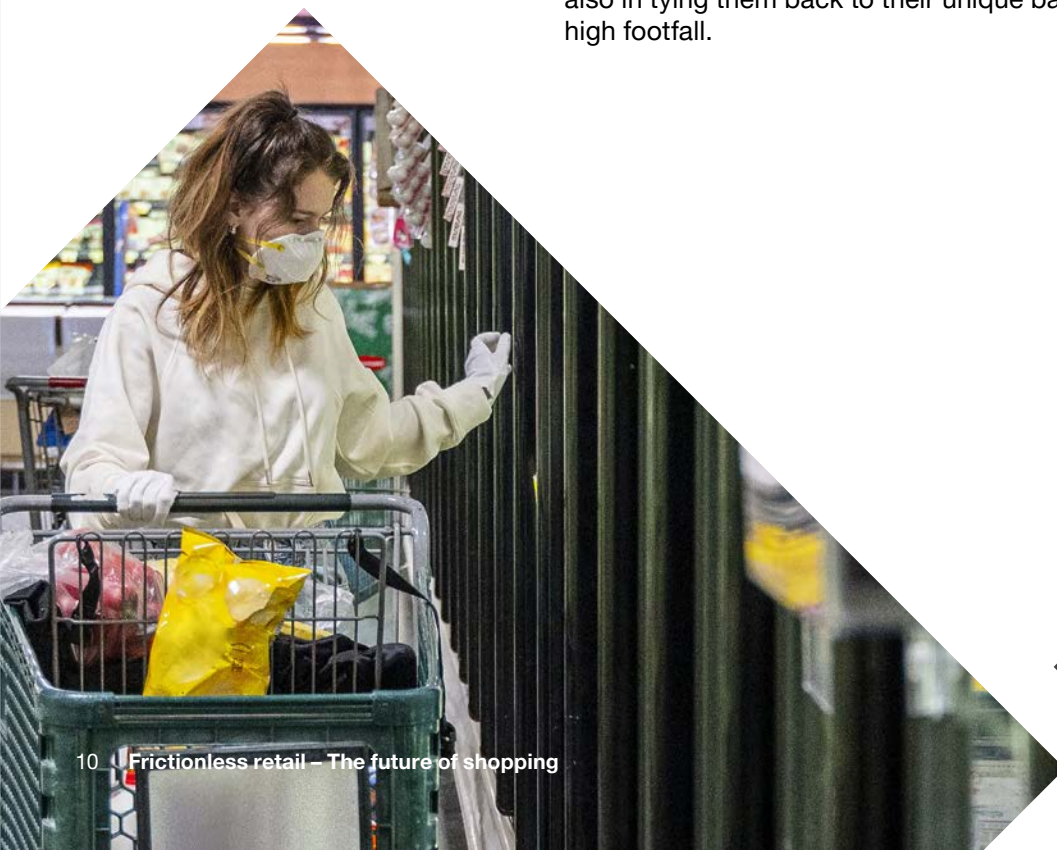
4. The vendors: Understanding the leaders in this space

The retail landscape has consistently changed over the years with some technologies being adopted at faster rates than others. Frictionless retail is no different. In 2016 the first frictionless retail store opened to employees in a US office building. Since this point, the number of stores in the US has increased dramatically to over 40 stores. As this value proposition has grown so has the number of vendors and the markets in which frictionless retail operates.

A great example of this can be seen within the UK market. A secondary growth market to the US, currently operating **23** stores across **5** retailers. These retailers are currently operating utilising 3 key technology vendors, all of which operating a similar yet fundamentally different technology solution.

Frictionless retail is enabled through an area of artificial intelligence known as computer vision, where computers use repeated exposure to digital imagery to accurately identify items in real time from a live feed. It takes about **1 million** images of the same item in order for a computer vision product to reach **99%** accuracy in identifying products in real time. This is then paired with machine learning so that the system is continuously learning and evolving in real time to improve the overall accuracy of the solution.

Crucially, the computer vision platform utilised by the frictionless technology providers does not make use of facial recognition to identify customers. Instead, the technology creates unique user profiles for that shop based on the customers' unique geometric and dimensional data influenced by items such as their clothing and physical characteristics. This data is not stored beyond the user's shopping experience. This is similar to the technology used in self-driving cars and is already utilised in a number of industries around the world including in aviation and in consumer electronics such as object recognition in mobile phone photo galleries. These unique IDs are crucial in helping the system not just identify the products a consumer is selecting but also in tying them back to their unique basket in a dynamic environment with a high footfall.





Each provider will tailor and tune their algorithms in different ways, but the majority of the underlying principles remain the same. Additionally, all of these systems will need to ‘learn’ before going live. As outlined above, in order for the AI to accurately identify products, it first needs to consume up to one million images of the product. Therefore, retailers will need to upload product images from their catalogue into the system for the system to analyse, and may need to conduct virtual demonstrations and testing to aid the system’s learning. This could ultimately extend into human intervention, auditing and cataloguing in order to guide the system to the correct result when it experiences events in which it has a low confidence of describing them accurately. There are three key technology vendors within the UK who supply the software and hardware to retailers. The output of the technology is the same – an enhanced, frictionless experience. However, the build, design, run and implementation of the technology varies. These providers can implement the technology into new built or refurbished stores, depending on the strategy of the retailer and each have different operating models in how they come to market.

The adoption of the technology within both the UK, US and Polish markets is still at its relative infancy. In coming years we as consumers can start to imagine a completely interactive and loyalty driven shopping experience. For example, imagine as a consumer you have scanned into your store and are walking around as you walk down the crisp aisle you receive a tailored discount based on your recent spend of **15%** your favoured crisps and dips. Additionally, a current limitation of these technologies is the inability to view a live ‘basket’ and its associated cost as you walk around. It is only a matter of time before this functionality will arise and even incorporate budget caps and in flight shopping advice based on your set desired spend by product and category.

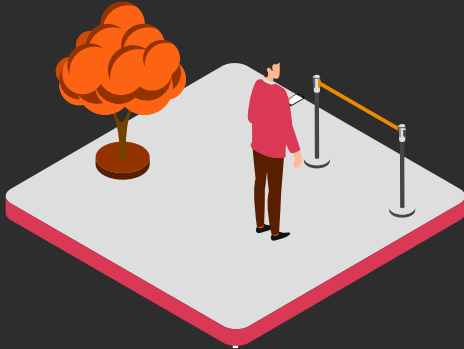
However, as with all technologies the market, sector and rate of growth for each vendor will vary as accelerated growth occurs. For example the ever increasing demand for smart venue and smart facility use cases is shifting the approach some vendors take to entering and conquering markets.

Although vendors may be shifting their broad approach to the user experience and customer mission flow are in relative alignment no matter which vendor you choose.

5. The user experience: Understanding the customer journeys and operational journeys enabling these technologies



Arrival

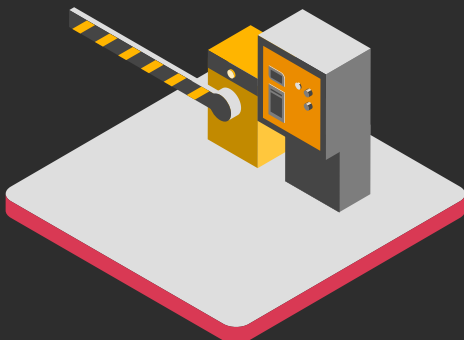


The journey begins with the customer arriving at the store, where they can authenticate at the door / entry gate using their app or credit card (dependant on frictionless provider).

Currently, all UK retailers utilise app entry (although some vendors offer credit card entry), which uses a separate app solely for frictionless shopping. However, retailers should consider the friction introduced by having a separate app and focus on improving their entry method.

Accessing this app will also require a reliable internet connection so retailers should consider how they provision this.

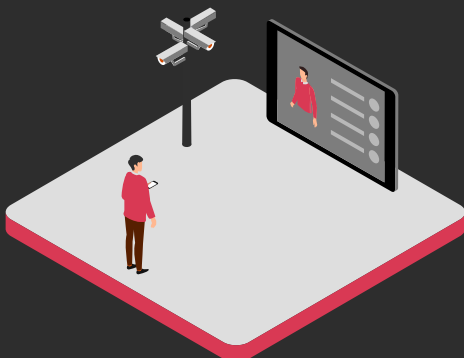
Gate



At this point the pedestal authenticates their payment details with a pre-authorisation hold (similar to petrol stations pay at pump facility), and if using an app will also connect to the customer record and validate them for entry. If customers are not validated for any reason, a pop up will display telling them why and the gate will not open.

Our customer research alongside evidence within the US market shows that debit / credit card entry increases the uptake and accessibility of these stores.

Camera



Once the customer (or customers) cross the pedestal the entry cameras associate their physical form(s) with a 'basket' and this is how the solution connects the products a customer selects with their account and ultimately their payment method.

Many consumers are rightly concerned about how their data is being used. Technology providers are conscious of this perception and adopt a 'privacy by design' approach, stores do not collect facial recognition data, but consumers are not yet convinced.

Retailers will need to consider their approach to their camera deployment. There is a large variety of cameras available, and while some frictionless providers will give a set type of camera, some will recommend a range and there can be large cost discrepancies between these based on the power and processing capabilities of the cameras. For example, some cameras are available that have built in GPUs to do image processing in real time to improve processing speed, but these are considerably more expensive than cameras which leave all the processing to the on premise servers.

Shopping



As the customer moves around the store, the cameras track them and their associated basket, so when a customer picks up a product, the computer vision identifies the product. Some providers also make use of smart shelving and RFID tagging to identify when products are removed from the shelves. However, this is specific to the vendor and AI enabled cameras are constant across providers.

Deciding to sell alcohol or other restricted products within your stores such as painkillers or tobacco may introduce friction to the journey with mandatory human checks. Some vendors do offer integrated solutions for automatic age checking but it is worth noting that a frictionless environment could increase the risk of inappropriate sales of restricted products.

Replace



If the customer puts a product down then the camera identifies this and removes it from their basket, even if they put it back in the wrong place.

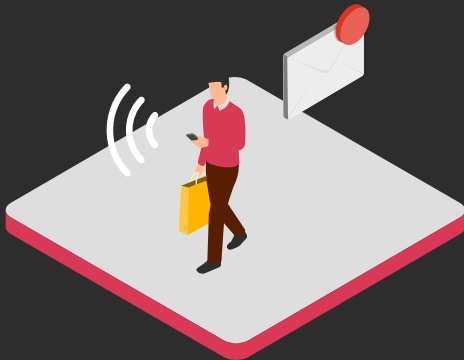
Items being in the wrong place in the store, increases the likelihood of low confidence events and errors. Many providers offer notifications to store assistants in near real time when items are placed in the wrong areas to help manage this.

Exit



Once a user finishes their shopping trip, they can simply leave the store (some retailers opt for a re-authorisation exit gate but this is not necessary to the solution) and the system begins the work of totalling their basket.

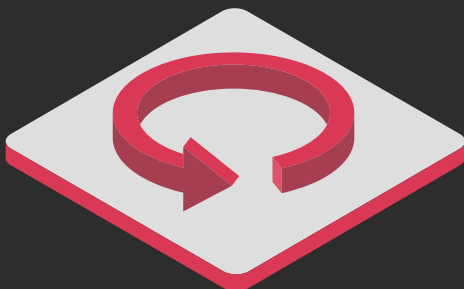
Receipt



Once the payment is completed and the basket is associated with the user, the customer will receive a receipt to their app or email.

Receipt timelines can vary which undermines consumer trust. In our research some receipts took up to two hours to be received. While the biggest driver of receipt latency is the customer's own behaviour in the store, many may not fully understand this. This may be more of an issue for budget conscious consumers, as the current technology does not allow for a live total cost of your virtual basket.

Return



In the case of a return, customers simply select on the app the item they would like to return and walk back to any of the retailers stores.

Despite the 99% accuracy of the systems, there are still 'low confidence events' which can be caused by any number of things from a blocked camera lens to wrong product locations. In order to remediate this, there will still need to be a team dedicated to resolving these low confidence events and updating the customer's receipts and basket. It varies between vendors whether this team would sit with you as a retailer or the technology provider. You will also need to consider how returns and chargebacks operate in these environments and whether this adds friction back into the journey.

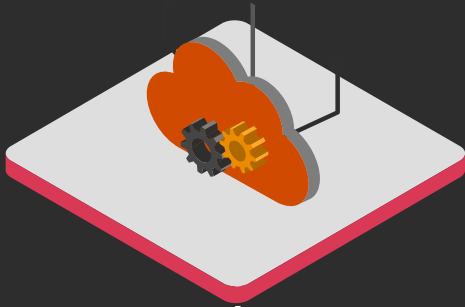
On premise processing



All of the data processing done during the journey we have just described above is done on site using edge computing due to the high volumes of data and intensive processing.

Because of the on site data processing, space will need to be made for a small server room on site that can process the real time data. This is likely to be much smaller than the space saved from removing the checkouts.

Cloud data processing



The complete basket is then passed out into the cloud as an output of this data, where the cloud connects to the retailers payment gateway for completion.

Back end processing



Here all other pricing and promotions, taxes etc. are applied and the completed basket is associated with a user account and sent to the payment gateway for payment to complete.

Data flows and processing are not yet real time which has a number of downstream implications. This will improve over time, but currently limits real time notifications, or data analytics.

Supporting business processes

Core supporting business processes such as the pricing, loyalty and payment gateways are all still managed by the retailers existing head office functions.

Planogram



The planogram is crucial to the operation of frictionless environments. The cameras associate the physical location of the items with the planogram to add the item to the basket.

The majority of the tech providers' planograms are not the same as a fully equipped planogram software. Therefore, most retailers will need to use this in addition to their existing toolset as standard integrations are not yet available.

6. The opportunity: Is grocery retail really the way to go?

The frictionless retail market, or 'checkoutless' market as others have referred to it, is a difficult opportunity to size. Why? The current landscape, use cases and ever changing technology advancements mean it's not entirely clear. As mentioned earlier in this report the technology is currently within its infancy although the use case opportunities are ever increasing.

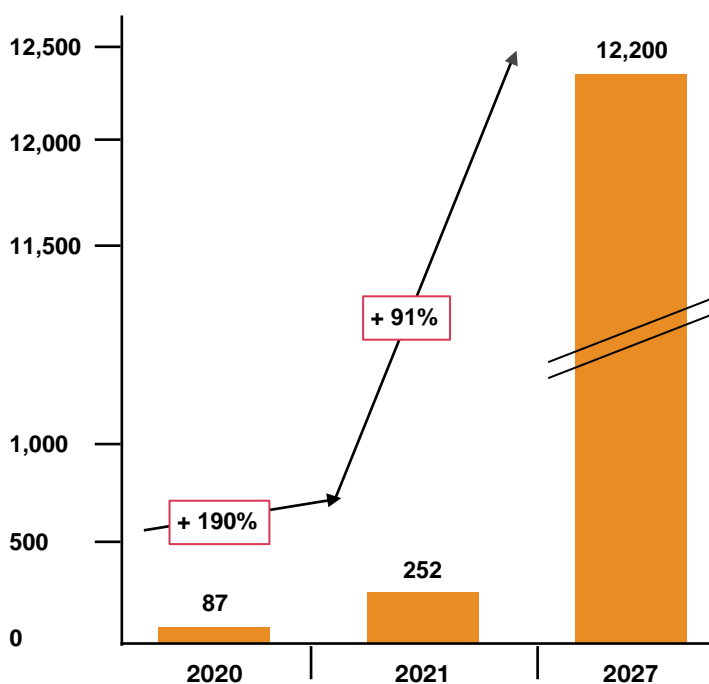
The number of transactions generated within the grocery environment make it a compelling target for SAAS based business models employed by the ecosystem of vendors providing frictionless solutions, along with the continuous

drive by grocery retailers to extract cost from their business and reinvest into a combination of price and service to the customer.

From the retailers perspective, considering some simple unit economics of a bricks and mortar format, 30-40% of store labour costs are within the checkout / tills which could be invested in providing better service in store and into the price of products, and if the right products could be available at the right time, this could uplift basket fill by **20%** and reduce waste by **0.5%**, thus increasing topline revenue while enhancing the customer experience.

The global number of frictionless stores is expected to grow at 91% CAGR, and may reach – \$400bn of transactions in 2025.

Number of frictionless retail stores, worldwide



Est. market size

2025

\$20B → **\$387B**

2022

Top growth regions

USA

China

Europe

Commentary

- Western Europe is expected to comprise ~40% of the total market size in 2025.
- Growth is expected particularly in the convenient segment, owing to simpler product lines and implementation costs.
- Uptake will be driven by larger retail chains with sufficient resources for the upfront investment required.
- Finding sustainable business models post-pandemics continues to be a key driver for retailers

UK supermarkets

For the purpose of this report supermarkets can be defined as ‘Supermarkets sell a range of groceries and food, including fruit, vegetables, bread, canned goods, toiletries, dairy goods, alcohol, cleaning products and cigarettes. Off licences, greengrocers and symbol groups and non-affiliated independent convenience stores are not included in this industry.’ (IBIS World industry reports)

UK supermarkets are predicted to generate **£190.8bn** by 2023 with this expected to increase to **£224.7bn** by 2029 across this period the number of supermarket establishments is set to increase by **13.85%**. This accompanied by the increasing cost in labour and need to reduce operational cost and drive net new revenue opportunities such as data monetisation presents an excellent opportunity for frictionless retail for both pre existing establishments as well as the new builds expected.

UK wider retail opportunities

Often when looking at use cases for frictionless retail we fail to account for wider routes to market such as petrol stations, clothing retail, electronics, books and even footwear retail.

Petrol station retail is the closest to current use cases with its small scale forecourts, although research shows that this sector is expected to increase **10.16%** from 2022-28. However, the expected employment within this sector is forecasted to decline **5.56%** presenting an excellent opportunity for frictionless retailers. It is worth noting that convenience store income only accounts for **15%** of petrol station revenue in today’s market. However with the shift towards electrification and increased dwell / ponder time at these forecourt locations frictionless retail will enable

Additionally when looking at the UK convenience store market alone (excludes major supermarket retailers) it is expected to increase by **16%** from 2022-2028 with the number of establishments growing from 35,521 to 41,341.

However, as alluded to within this report, a number of wider growth and opportunity areas have arisen for these technology providers across sectors such as smart stadia, clothing retail, festivals and events. Although we say the adoption of these technologies is in its relevant infancy, these new opportunity areas have already come to fruition. For example one technology vendor has launched a small frictionless retail shopping experience for food and beverage services within a premier league football club – reducing wait time, ponder and increasing people flow and sales.

retailers to reduce space and increase capacity taken up by the current retail and checkout methods deployed at these locations.






Alongside petrol stations clothing and footwear retail present an excellent opportunity for frictionless retailers. Currently, technology providers have been unable to deploy their technologies due to difficulties identifying and maintaining sizing accuracy across ranges. However, if these vendors are about to provide a solution for these pain points (such as using RFID pairing) they could be first movers in attaining a foothold in two markets expecting accelerated growth over coming years (Clothing retail is set to increase **13%** in revenue by 2028 and footwear retail **19%**).



UK smart venues market expectations

Following the COVID-19 pandemic consumers are ever exploring real world and in person experiences. A high proportion of these exist today across venues such as cinemas, sports clubs (such as premier league football), festivals, conference centres and amusement parks. Each of these experiences include onsite retail opportunities for both the established food and beverage use case we have seen, but also for the broader onsite clothing and footwear opportunities such as merchandising at football clubs.

As an example, the UK festival market generates **32%** of its overall revenue from onsite revenue such as food, beverages and merchandising, all of which are applicable to frictionless retail use case opportunities. Alongside this, the number of festival venues is expected to increase by **33.7%** from now until 2028. When you accompany these statistics with the expected revenue growth of festivals in the UK being **44%** in 2028, it creates a clear picture of the potential opportunity for both retailers and frictionless retail providers.

Market growth est 2028	%
 1. Cinema	77%
 2. Sports clubs	30%
 3. Festivals	44%
 4. Conference centres	137%
 5. Amusement parks	15%

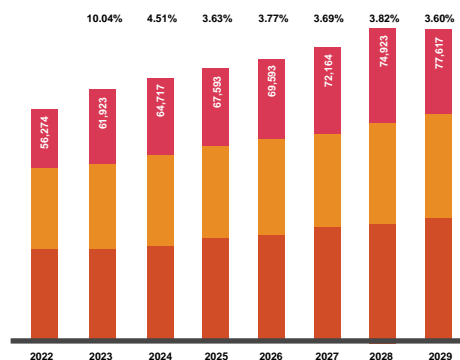
Wider UK opportunities

3 further markets demonstrating excellent opportunities for frictionless retail and retail providers are those across hospitals, hotels and food / beverage markets (full service restaurants, fast food, pubs). Later in this report you will understand how different customer groups perceive frictionless retail and their appetite to shop at these stores. One key statistic to note is that those females identified as 'most likely' to shop at frictionless retail stores account for the highest percentage of hospital patients (of the female population, those aged between 30 and 34 years accounted for the most hospital admissions in 2020-21, accounting for **7.6%** of total admissions.)

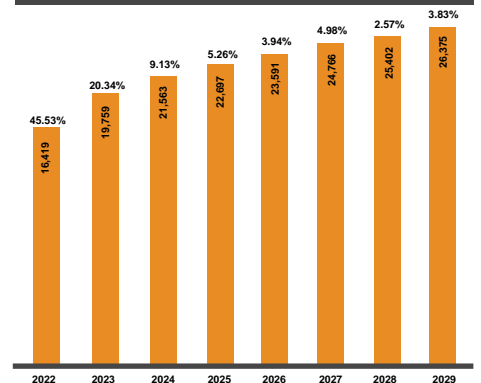
Food and beverage sales account for **22%** of the UK hotel revenue streams. This accompanied by easing restrictions, high inflation and extreme labour shortages presents a large opportunity for frictionless onsite stores for a market expecting to grow from **£16bn** up to **£26bn** by 2029. The decline in the pound is likely to boost 'staycations' in the UK. Thus, increasing the likely spend on food and beverages at hotel facilities.

The UK pub market shows that **43%** of their revenue comes from beer and wine sales (proven use case within a premier league football clubs frictionless store) – this equates to revenue of **£9.8bn** in 2029. Additionally, **38%** of full service restaurants revenue comes from beverage sales, a value of **£10.4bn** revenue in 2029.

Expected market growth rate by revenue (£bil)



Expected market growth rate by revenue (£bil)



Pub revenue Fast food revenue Full service restaurant revenue

7. The customer: This is not the first shift in customer buying habits

Consumer shopping habits have fundamentally changed over the years and retailers have had to react. Fundamentally this is not retailers first rodeos.

If we look back at the way in which customers and retailers have interacted and operated over recent years, the growth and development in our habits is clear. Using these trends we can start to paint an image of what may be next and how Frictionless can help.

The foundations of change within the retail market



Retailers – rise of the discounter



Payment method



Multi-channel propositions and delivery



Loyalty and reward



Shopping missions – rise of the multi-shop and convenience

The 2002 shopper

The customer:

Customers on average did one large weekly shop in which the majority had to commute. However, at this time card payment had started to rise (cash payments remained high) however contactless payments were yet to come to fruition.

The retailers:

Retailers were unable to gather much data on their consumers, with very little offering a personalised / bespoke loyalty or customer service programme. At this stage it was very much focused around an end of month review of what had sold – focusing on reactive stock management rather than predictive customer needs and up / cross sell opportunities.

The 2012 shopper

The customer:

German discount stores started to push their foot in the door with the UK market. As such customers started to do multiple shops per week utilising these discount retailers for set purchases. As a result the original UK retailers had to adapt as average basket size dropped but the frequency of shoppers increased.

The retailers:

Large scale retailers started to utilise external loyalty providers to try and retain their customer base. The majority of these programmes were facilitated via a physical card the checkout assistant would scan as you shop alongside printed vouchers to utilise for either discounts in store or online for experiences.



The 2022 shopper

The customer:

Customers now have the ability to view, pay and accept goods in nearly any form. The growth of contactless, apple pay, google pay and the growth of e-commerce throughout COVID-19.

The retailer:

Retailers utilised COVID 19 as a catalyst for change driving sales through e-commerce platforms. Retailers have started to use cross platform approaches bringing the consumer under one umbrella to understand online and instore purchases as well as purchasing or developing their own loyalty programmes to create personalised offers for their customers. New shopping methods such as self checkout and scan as you shop have started to take over our desired approach, and new approaches and technologies such as Q-commerce and frictionless have started to appear.

The 2032 shopper?

The customers:

Customers will be able to shop across multiple platforms without the physical need to checkout. When in store customers will have the ability to receive real time personalised promotions and discounts based not just on their spend but their movement and dwell habits from instore and online. This progression will merge the experience across platforms creating one holistic journey / experience for customers. Consumer segmentation will be done at a micro-segment level, with technology solutions that will be able to dynamically route you to fill your predictive basket based on your profile, and stock availability will be available in real-time.

Retailers:

Retailers will get live data from consumer shopping habits and instantly be able to adjust forecasts and send stock to relevant areas in real time. Gathering a holistic view of their customers spending and navigation habits across online and onsite locations. These retailers will be able to utilise these technologies to create net new revenue streams around data and insights.

What do our customers say today?



8. Connecting with customers

All eyes on Gen-Z?

COVID-19 revolutionised the way in which we as customers interacted with our retailers. However, the accelerated growth of 'in person' retail following the ease in restrictions is creating a complex consumer who has a multitude of clear demands and needs.

Previous PwC research shows that:

- Personalisation is a priority for consumers with **4 in 5** consumers being willing to share some type of personal data for a better experience. Information such as email address, birthday, age and sex / gender top the list.
- **41%** of consumers are willing to pay more for a product if they can purchase them more quickly and conveniently.
- Leading and differentiating organisations typically invest **33%** more in digital transformation programmes.

All of which lean towards and support the concept of frictionless retail. So why has it not taken off as we expected?

In order to truly understand how the customer and market perceive frictionless retail we have conducted a study of **5,000** UK respondents focused around frictionless retail and their understanding and appetite for the technology in a grocery retail aspect.

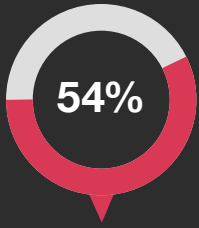
1 in 2 shoppers today would actively switch to a frictionless store vs regular store. This rises to **3 in 4** when we look at those below the age of 45. Looking back at similar trends in retail, and what the data is telling us, it is clear that within the next 10-15 years the majority of UK shoppers will be seeking a frictionless shopping experience, or more accurately, will be exposed to a frictionless experience at some point during the day.

It could be said that the consumers' appetite to spend has changed as a result of recently increased inflation, however even before current economic factors, the longer term trend over the past 2 decades has been for real disposable incomes to reduce, driving consumers to continuously look for value products and services. In today's environment, we found on average **31%** of consumers surveyed expect to spend more on their grocery shops. When this is coupled with the change in customer behaviours and their ever increasing need for a personalised and seamless shopping experience, it presents a significant opportunity for UK grocery retailers. For example **28%** of consumers say they will buy more special promotional offers in the coming 12 months – something which frictionless retail has the ability to support and develop utilising real time personalised data.

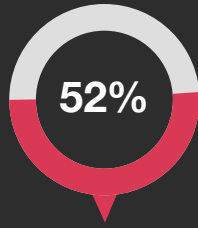
Before exploring the specifics and opportunity areas for frictionless retail we must first understand how consumers shop today. A number of checkout experiences currently exist with retailers often offering a hybrid approach in store.



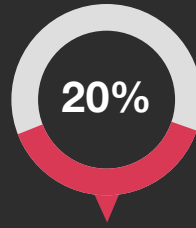
Of the 5,000 respondents, we found they shopped



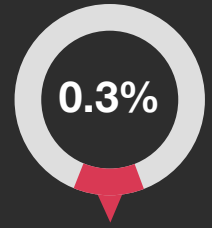
At a staffed checkout



At a self-checkout

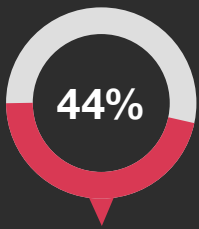


With scan to shop

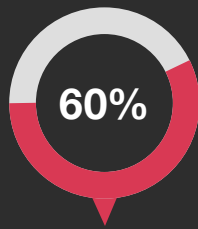


Other

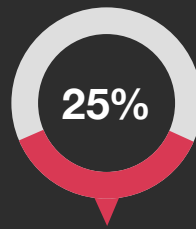
Within these 5,000 respondents 55% responded saying they would shop at a frictionless store – when looking at this subset of respondents we found they shopped:



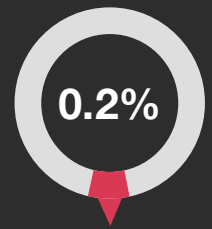
At a staffed checkout



At a self-checkout



With scan to shop

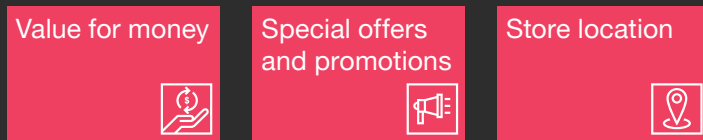


Other

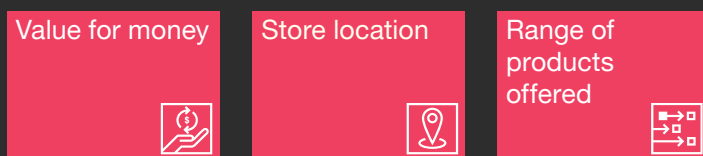
This initial research demonstrates a clear objection to friction within the retail experience. For example, with only **20%** of customers saying they shop at scan to shop stores highlighting how this technology is not solving the customer pain points around convenience and friction and is in fact adding friction to the shopping experience. Additionally, these findings point once again towards the appetite for no staffed checkout with over half looking to avoid a staffed checkout.

When looking at what matters to consumers when conducting a weekly shop we are able to identify a clear distinction between priority concerns for those who ‘would shop at a frictionless store’.

Of the 5,000 respondents we found that:



Within these 5,000 respondents 55% responded saying they would shop at a frictionless store – when looking at this subset of respondents we found that:



It is clear that customers are looking for a clear value exchange or incentive to switch to these stores. Given that convenience is a core driver for changing consumer behaviours, it is no surprise that store location is a key value driver. However, when looking at the full 5,000 correspondents, one of the key drivers was special offers and promotions, additionally, when you look only at those who say they would shop at a frictionless store, this drops off the list of drivers and is replaced by product range. This provides an initial indication that in order to convert those customers who won't shop at frictionless stores, retailers must offer a clear value exchange for their service / switch. Whereas for those who will shop they must utilise geospatial analytics to provide their customers with tailored products mixes based on the customer demographics and demand.

However, how do these views, perceptions and priorities change when looking at those who currently do not shop at frictionless retail stores / would not choose too and how can we sway these consumers to change their perceptions.

First we must personify the key user group.

8.1. Getting to know your customers



26%

The Avoiders

57% of people who said they wouldn't shop at frictionless stores are female.

55% of people who said they wouldn't shop at frictionless stores are in the age brackets of 55+.

34% of people who said they wouldn't shop at frictionless stores are retired.

50% of people who don't want to shop at frictionless stores have not heard of the store.

44% of people who don't want to shop at frictionless stores have not entered the store but have heard of the store.

6% of people who don't want to shop at frictionless stores have entered and heard of the store.



26%

The Indifferent

62% of people who said they are indifferent about shopping at frictionless store are Female.

28% of people who said they are indifferent about shopping at frictionless stores are 65+.

31% of people who said they are indifferent about shopping at frictionless stores are employed.



48%

The Adopters

48% of people who said they would shop at frictionless are female .

40% of people who said they would shop at frictionless are between 18-34.

47% of people who said they would shop at frictionless are employed full-time.

50% of people who want to shop at frictionless stores have heard of these stores and have been there.

33% of people want to shop at frictionless stores have not entered the store but have heard of the store.

17% of people who want to shop at frictionless stores have not entered and heard of the store.





8.2. Getting to know the Avoiders

Whilst we have a large captive segment, our survey also shows **35%** responding say they would be 'quite unlikely' or 'very unlikely' to shop a frictionless experience in a large format store (this falling to **26%** for smaller convenience stores).

This presents a significant challenge. If a frictionless experience was to become the only in-store option available, a third of current shoppers could potentially be driven away from the store and into competing retailers. This scale of risk is simply too great to ignore and needs addressing from the outset.

They know the store but haven't been...Why?

Of the 2,450 overall respondents who answered that they have heard of frictionless but have not been – **46%** of them fall within The Avoiders category. Again taking a look deeper it becomes clear there is a significant set of consistent reasonings behind this group not wanting to shop at frictionless:

22%

say I am concerned about sharing my data.

20%

say I don't trust the technology.

14%

say I like to interact with staff.

Other also say mainly (no smartphone, no human interaction or people losing jobs).

How do we make a difference?



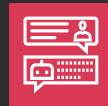
If it is easy to use – utilising in store and online upskilling methods retailer need to utilise technology to help upskill and teach the customer how and why they should use the tech. For example bespoke discounts, faster journeys etc.



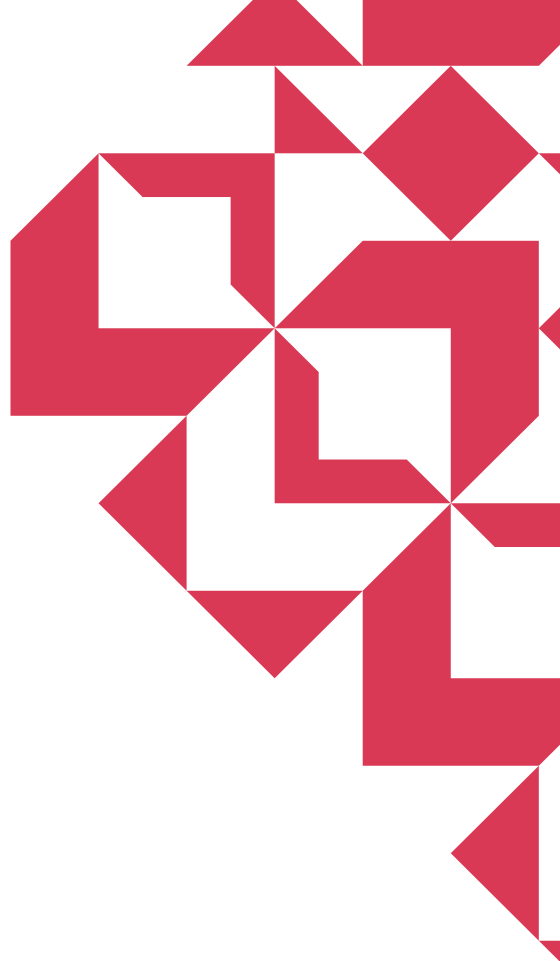
If it is a brand / retailer I trust – Retailers brand image and perceived value plays an important role in the uptake of new technologies by utilising brand position organisations can help drive change and therefore adoption into the market.



If it is cheaper than a non frictionless store – Discounters are well positioned for frictionless retail however this does not mean more expensive retailers are out the mix. All retailers can utilise promotional campaigns and discounts to help drive footfall from the outset.



By understanding some customers won't change – That said 15% said they don't want anything, because they will never shop in this kind of store (primarily because they don't want to buy a smartphone and they want human interactions).



Are they avoiding it or do they just not know what it is?

When looking at the Avoiders closer we learn that of the 992 (1,630 when looking at the full data set meaning Avoiders account for **61%** of this total pool) that responded that they have never heard of frictionless stores and would not like to shop there said so due to three key reasons:

18%

don't know enough about the store.

17%

Don't trust the technology.

17%

are concerned about data and security.

A further notable mention from within the free text field – 'Enjoy shopping in the normal style and are concerned around job loss'.

The majority of this group understandably want to know more about the technology in order to make a conscious buying decision to change the way they shop. This said having now educated these customers on what frictionless actually is...what would make them shop at these stores given the choice?

23%

Nothing.

13%

If it is easy to use.

20%

If it is cheaper than a non-frictionless store.

12%

If there is clear information about how the store works.

3%

other

Once you have been there, do you stay there?

Finally when looking at the **920** survey respondents who confirmed they knew what frictionless was and had been there only **14%** fall within the Avoiders category. But why, having already experienced the stores and its capabilities, would they still choose to shop elsewhere

Would like to interact with staff.

Concerned about sharing data and security.

Prefer to shop online.

And what would enable these shoppers to change their minds?

It is cheaper than a non-frictionless store.



If it is easy to use (mostly people from the groups 55-64 and 65+).



If it is much quicker than using a non-frictionless stores (mostly people from groups 18-24 and 25-34).



Overall it is evident that the Avoiders fall within the older demographics demanding a more personable and face to face interaction there is still an opportunity to convert a vast majority of these customers to frictionless retail through the means of,

Upskilling around the technology, specifically:

Ease of use.



How the technology actually works.



How data is kept and processed and therefore safe.



However, we should remain mindful that with all the promise of digital technology, the UK grocery shopper is incredibly diverse and covers almost every end of the demographic spectrum. Therefore whilst a one size fits all approach may become the norm in the longer term, the short to mid term must consider the shopper needs and help them embrace and successfully adopt the new shopping experience.

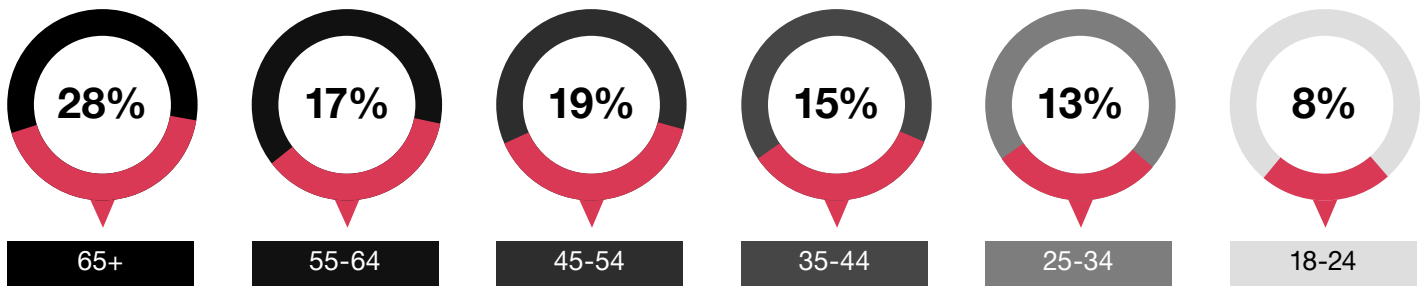


8.3. Getting to know the Indifferent

Similar to the Avoiders the Indifferent should be treated as a group of customers who still need persuading and gathering trust between. As a result many of the previous methods of conversion apply throughout this customer group, including their reasonings for not wanting to show at frictionless stores.

Who are they?

Similarly to the Avoiders category the Indifferent sway towards the older generation with **64%** being above the age of 45 and **28%** being above the age of 65.



In correlation with this **26%** of this category are retired and another **17%** are part time employed. **67%** of the Indifferent customers currently shop in one of the big 4 supermarkets in the UK with an additional **26%** shopping at one of the 2 large discount stores.

Is means of entry important?

Within this category group **54%** prefer the idea of entering a frictionless store by tapping a bank card of some kind over a mobile app QR system.



54%
Credit / debit card.



28%
Mobile app.



12%
None of the above.

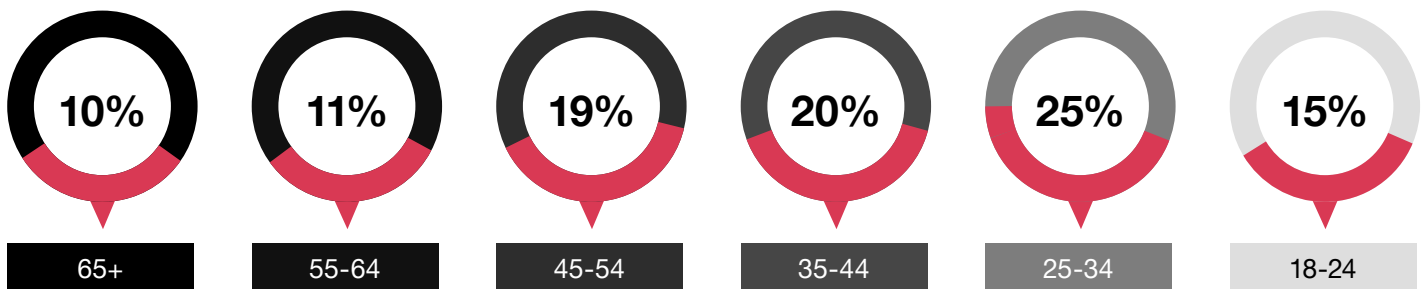


6%
Biometrics.

8.4. Getting to know the Adopters

Who are they?

48 % of our 5,000 respondents fall within those who would like to shop at frictionless retail stores of this group 45% fall between the ages 25-44.



We see a fairly even split across genders with a 50 / 50 split between male and female. However when we look towards the occupations of these customers we can see a large skew towards those in employment, with **53%** being full time employed and **15%** being part time employed. **65%** of this group currently shop at one of the big 4 supermarket retailers in the UK as their main shop with a further **29%** shopping at the 2 large budget retailers.

How do they want to enter?

As mentioned earlier in the report there is a multitude of ways in which vendors can enable access into frictionless stores. Predominantly in the UK vendors have used app based QR code scanning. However when looking at the **48%** of UK consumers who actively want to shop at frictionless retail stores the preferred entry method is mixed:



47%

Credit / debit card



43%

Mobile app



9%

Biometrics



Maximising the early adopter advantage will be vital

A starting point for building that shopper understanding is their current appetite and willingness for the technology. Whilst shoppers may be aware, would they actually trial a radically new form of shopping experience and would they be willing to overcome the conscious and subconscious barriers to change?

Of course trial is only the first stage, ensuring repeat purchase is the true test of whether the value proposition works for the retailer and fundamentally the shopper. In a market where overcoming switching barriers has never been more fiercely fought, if the technology experience doesn't deliver, the shopper will quickly decide with their feet.

In our survey, when asked if they would shop at frictionless stores, **48%** responded quite likely or very likely. Of this 48%, **52%** fall within the Adopters category, this rises to an overall **53%** of respondents say they are quite likely or very likely to shop at frictionless stores if it is for smaller top up based shopping.

Given this, we would expect the early adopter phase to capture momentum fast regardless of mission type.



Getting it right for the early adopters will be imperative to longer term success

Initial shoppers will help ensure store revenues are maintained, be the source of positive customer sentiment which can be leveraged to drive up adoption. The first mover advantage is of significant importance, as the lead times to rolling out new stores or store refits will create a large window of opportunity to lure competitor shoppers into store and drive up not only trialists but repeat shoppers and ultimately penetration gains.



9. How to be successful in Frictionless retail

As with all new technologies, especially retail revolutions businesses and the associated technology vendors will face a multitude of challenges. Those who effectively navigate these challenges quickly and efficiently are those who will be best placed to maximise on the expected growth of frictionless retail and its multitude of use cases.

Landing the change will require a robust transformation strategy and implementation plan. Retailers are at different stages of maturity with frictionless stores, but we can already take a lot of learnings from implementations to date to support those in the early stages of their journey.

1. Be bold

Do large, geographically diverse pilots (5-10 stores) rather than single stores in one city – there is a lot of effort involved in setting up the pilot for one store. Multiple stores will enable a better measure of pilot performance and have more data to test within the tool – one store won't suffice.

2. Go Hybrid at first

There's still a significant proportion of customers who haven't heard or are unwilling to shop frictionless. Perhaps one of the reasons Amazon has had to pause operations in the UK is they've gone too digital too soon. A hybrid solution would enable a more steady transition to frictionless without alienating a significant proportion of customer base.

- **52%** of customers need to be convinced to switch.

3. Make the customer journey as seamless as possible

There is certainly still friction to contend with in today's shopping experience, identifying opportunities to mitigate this as much as possible will help showcase the value of switching to frictionless – can free WiFi be offered? Can there just be one app which is easy to sign up and use?

4. A frictionless store should explain itself

It's a delicate balance between making sure the customer can navigate the new customer journey and information overload. It's also important for the Customer to be able to identify that they are in a frictionless store as opposed to traditional stores so that they don't feel confused or frustrated upon entering.

5. The new tech is only as good as the people who use it

This is a significant change for employees and customers, make sure to invest in change management strategy and implementation for both so that customers are informed and employees are well equipped to support with any guidance or troubleshooting that arises.

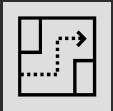
- **18.7%** of all people that have put a reason to not shop at a frictionless store say it is because they don't understand it.



10. It's not all about frictionless checkout

The future is exciting. It's more than just saving on labour and improving customer experience. Frictionless retail and the use of AI has some significant opportunities that will revolutionise the way customers shop and the way retailers operate, to deliver cost efficiencies, drive market growth and increase customer satisfaction.

Many of these opportunities echo those that retailers have already started to exploit in the online space, such as those around data and analytics. However, many are only possible because of the level of detail that the technology that enables frictionless retail, namely computer AI vision, provides.



Enhanced customer journeys

The camera software has the ability to bring the customer journey to life – we can see the flow and duration of routes, any challenges or friction caused to the customer throughout the in-store experience. These insights can inform the customer and the store format strategy, to increase satisfaction of customers and the efficiency of throughput for retailers.



Real time offers and loyalty rewards for customers

Use of detailed opt in customer profiling can provide real time personalised rewards at impactful moments in the store that drive both conversion and positive customer experiences. This can also minimise switching. This may lead to partnerships and funding from key suppliers.



Retail operational efficiencies

The workforce can be streamlined to focus on value-add activities enabled through the real-time insights, including, ongoing management of the stock, range, performance, waste and promotions. A reduced number of cashiers are required, and the skillset of the workforce will evolve with the technology enabled stores.



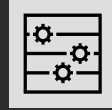
Range optimisation, product mix and promotional activity

The software can provide a detailed view of the range performance. For example, the dwell time can be calculated and compared vs. similar products to understand in store performance. A promotional plinth can be assessed in terms of performance of sell through as a metric over time and the software can track lost sales like online platforms can today. These rich insights can inform customer strategy, product mix, product placement and promotional activity, ranging and even allow more accurate carbon reporting.



Predictive stock management

Computer vision will be able to support predictive stock management by identifying low stock products. Linking this data with external sources such as weather, promotions and events will support intelligent ordering software, **improving on shelf availability and the customer offer**. This information can also be used to optimise the cube of the pallet, to make sure the SRP produces the right shelf fill, in line with the stock sell rate.



Reduced waste and optimised markdown process

Intelligent ordering will improve on shelf availability and reduce waste as the **right products will be on the right shelves at the right time**. The data can also automatically link up with promotional activity to make sure the mark down is right for the customer and the retailer. Cameras will be able to track flow of goods and sell rates which will help to **optimise the markdown process**.



Data monetisation and net new revenue streams

Retailers will have the ability to **generate net new revenue streams** by utilising data such as the customer segmentation data. The flow in store and dwell time of around certain products can also be analysed to sell back and work with CPG's to derive insight around product positioning and brand perspectives in store.



11. Considerations for retailers for selecting and deploying these technologies



It's not as simple as deciding to implement some checkout free stores and claiming to have a successful frictionless retail offering. The decision on where, when and how to implement the checkout free technology needs to be carefully considered in line with each retailer's strategy, operating model and most importantly the customer base and proposition.

Firstly, frictionless stores are different to conventional stores, and therefore, you need to consider how the frictionless technology will integrate into your existing operating model. You need to assess your strategy, KPIs, and understand where new capabilities, processes and skills will be required and the employee training and engagement that will be needed to support.

Secondly, location and product mix are key. You need to ensure that you have the right products in the right store. By assessing the geo-spatial and consumer demand data available you can define your proposed frictionless locations, the store formats you want to introduce, and refine your product mix for each store based on this to strike the right balance of frictionless and a complete offering.

To shape your frictionless strategy, it is critical to also understand your customer base, their needs and mission. With frictionless being a relatively novel concept in the UK, the new shopping missions need careful thought and design to ensure frictionless is an appealing offer to your customers. For instance, universities can look to embed frictionless technology to target younger generations who will be comfortable adapting to the change.

Retailers must also consider whether your portfolio is better positioned for store refits, new stores or a hybrid of both. Store refits are significantly faster to set up than opening a new store which will support a faster retail roll out. However, retailers must provide very clear communications of the changing offer to customers to avoid any confusion.

Beyond your strategy, there are key technology limitations that need to be addressed and considered to ensure any issues are alleviated. Despite **99%** accuracy of systems, there are still 'low confidence events' which can be caused by a number of factors including blocked camera lens to the wrong product location. When scaled up to the volume that retailers expect in terms of transaction and footfall, this can still amount to a relatively large number of reviews being required. Retailers will need to consider having a team dedicated to resolve any low confidence events that arise to remediate this issue. Data annotation allows for the system to learn quicker and better. Having a well thought out design for managing data will be critical between the winners and losers.

Computer vision is also currently limited to more 'solid' products, and therefore, items such as clothing, loose items, and very similar items may be difficult for AI to differentiate between products, causing havoc with stock maintenance and baskets. Retailers will also need to consider legislative blockers such as alcohol or tobacco that will prevent stores from being truly frictionless. Additionally, with credit card entry being the preferred method of entry throughout all of our customer research (**47%** of all shoppers preferring this method of entry), not all providers currently offer credit card entry, and therefore, retailers will need to be mindful of this blocker when deciding which vendors they choose. Finally, because of on site data processing, retailers will need to ensure there is a small server room for the real time data processing, although this is likely to be much smaller than the space saved from removing the checkouts.

12. Food for thought: 10 Key points to consider

Although frictionless and computer vision AI technologies are in their relevant infancy in terms of roll out across markets within retail, our research shows that both consumers and retailers can explore new and evolving benefits from these technologies. With this in mind there are a number of key considerations for both customers and retailers when considering frictionless retail technologies:



It's here to stay

We see frictionless retail solutions becoming prevalent across multiple shopping missions and channels. From groceries to fashion, customers will experience frictionless shopping experiences throughout their day becoming the norm in the way we purchase products.



FrictionLESS

Retailers must consider the end to end mission for customers, they need not introduce friction into the frictionless experience environment where not necessary. For example, if a customer has to spend 5-10 minutes outside a store to set up an app this will kill the shopping mission in its tracks before either the customer or retailers see a benefit.



Reduce cost and improve customer experience

Frictionless retail technologies enabled by computer vision AI have the ability when implemented well to help drive down operational costs for efficiency optimisation and increase customer service and satisfaction by decreasing friction, enabling personalisation and allowing employees to spend more time on customer service activities that form memorable experiences.



It's not just about grocery retail

As this technology develops and uptake increases we see frictionless retail solutions becoming embedded across multiple shopping missions and channels, from food and merchandise within stadiums, through to duty free within airports. Computer vision AI will play a role across multiple shopping missions.



Data is king

Annotated data will be the defining element in serving customers better and defining the offer. Retailers that embrace the opportunity to optimise and collect data early will be the ultimate winners.



It's not one size fits all

Not all technologies are the same, so choose wisely, based on your customers, locations and use cases. Solutions vary from vision only, smart shelf augmented systems, fixed planograms versus dynamic layouts or even fixed premises vs portable adaptable premises such as pods or containers.



Communication is critical

Communications are critical to educate customers and make them feel comfortable with the technology. As with all new technologies customers take time to warm up to new concepts. Utilise communications to build trust and transparency with your customers.



Frictionless is just the start

The technology should be seen as foundational in enabling other services to customers beyond the checkout. Whether it be offering better range optimisation, personalised promotions, bespoke loyalty programmes, optimising trade marketing, managing stock and waste, to a better layout of the store environment.



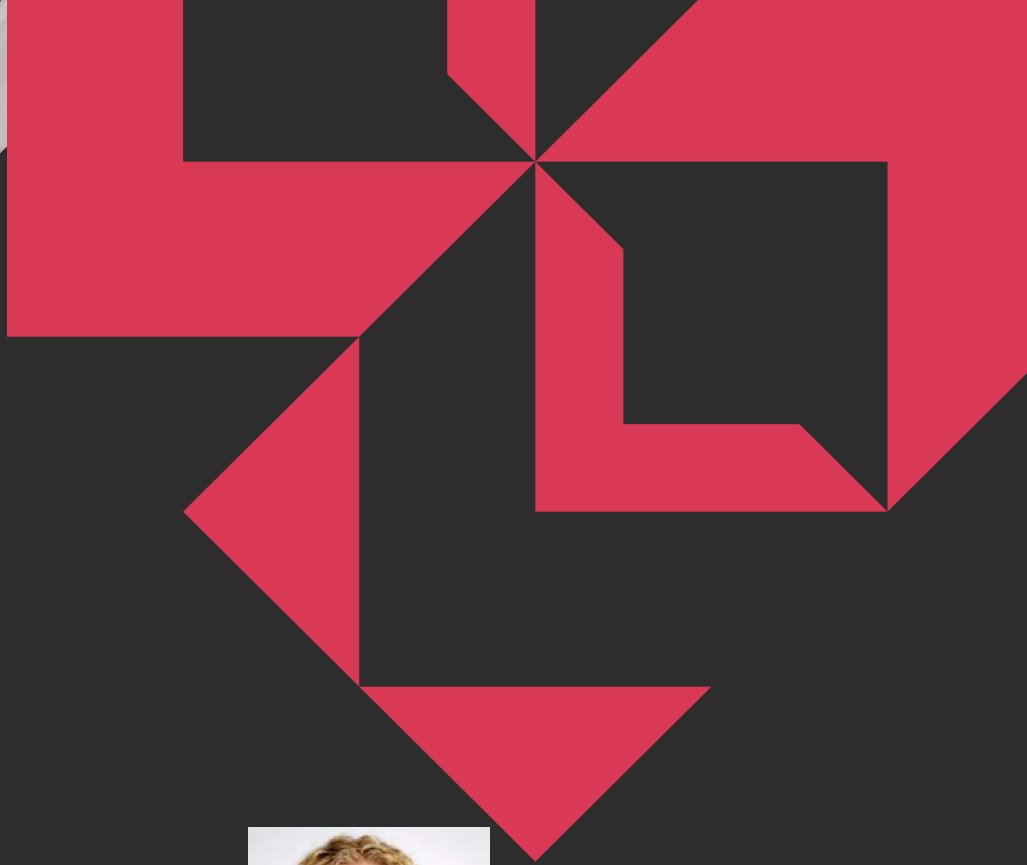
Geospatial analytics is key

Retailers should use geospatial analysis and have a good understanding of the shopping mission to carefully pick their first few stores. 'On the go' environments, inner city locations catering to convenience, where there are a greater majority of the younger generation of shoppers, will most likely prove to have higher and faster adoption rates.



It's not just about the physical store

The frictionless shopping experience will expand from the confines of the store and will ultimately provide that online to offline experience for customers where they can for example plan their basket, have their app route them to their products and ultimately walk out, with the out of stock items being delivered to their home later that day.



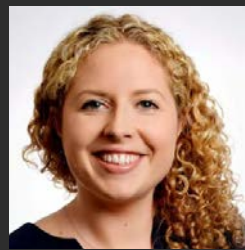
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