

Cashierless Technology at Grocery Stores: An Imminent Step towards Safer and Smarter Shopping in Penang

By Dr Beh May Ting (Senior Analyst, History & Regional Studies Programme)

Executive Summary

- The experience of grocery shopping changed for many during the pandemic. Cashless payments are now more predominant, and online grocery shopping has become a common option for people who choose to get essentials delivered to their doorstep.
- Moving forward, retailers will need to re-evaluate the number of touchpoints in their stores, and minimise them in order to protect staff and customers.
- Grocery shopping experiences are becoming as contactless, seamless and frictionless as possible in order to avoid virus infections.
- Drawing inspiration from Amazon's Go Grocery chain in multiple locations in the United States and London, Tesco's GetGo checkout-free store in London, Cheers (subsidiary of NTUC FairPrice) and Pick & GO convenience chains in Singapore, and multiple other till-free grocery stores in Europe, this paper recommends that Penang similarly integrate this 'Just Walk Out' shopping experience soon.
- Policymakers will need to collaborate with grocery industry players, technology providers such as mobile development companies, and financial service companies to encourage the introduction of cashierless grocery stores, and accept this as an inevitable step adapting the retail trade in a post-Covid world.

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Introduction

Images of people panic-shopping and queueing to enter shopping malls to buy groceries surfaced at the onset of the Covid-19 pandemic (*New Straits Times*, 2020) as a shocking phenomenon. Panic buying in general puts a strain on supermarket retailers and results in crowds navigating packed checkout lines (Lufkin, 2020). Waiting in long lines at grocery stores increases the time spent in congested public areas which decreases the ability to physically distance oneself and raises the possibility of virus infections.

Many businesses have been forced to operate digitally during the pandemic. While some shoppers have had the privilege to shop online, many others need and/or prefer to physically acquire their groceries at the stores. In fact, retail technology in recent years started offering self and automated checkout in order to reduce friction and manpower. In Penang, this service has been available at retailers such as Lotus's (formerly known as Tesco), Mercato, and IKEA. This checkout option requires customers to scan their purchases and pay with their bank cards before exiting the stores.

While this is a meaningful step forward in retail technology, customers still need to wait in line at self-checkout machines and encounter regularly touched surfaces such as the scanner guns and the counter tops.

Seamless, Contactless and Efficient Shopping

Cashierless stores are a new retail concept that is gaining traction globally. It offers a seamless shopping experience which saves time and manpower, and reduces contact which aids in lowering the risks of virus spreading. Artificial Intelligence-driven and fully-automated cashierless technology is a solution that layers digital commerce capabilities onto existing spaces with zero downtime to business (Trigo, 2021).

The pandemic appears to have permanently changed customers' shopping habits. The wide adoption of e-commerce strongly indicates that consumers' wish for convenience needs to also be applied in-store. The concept of cashierless stores is a pioneering innovation of what is being called the Phygital (physical and digital) experience. Phygital is a term now used to describe technology that bridges the digital world with the physical world with the intent of providing seamless experiences for consumers (Petro, 2021).

Cashierless shopping technology allows customers to enter stores after scanning the store's app; they then pick the items they want and exit without waiting at checkout lines. Such stores are equipped with cameras and weight sensors which automatically track customers and the items they pick up (and put down). Once done, shoppers merely leave the store without having to scan the items or to interact with cashiers. Payment is automatically processed upon exit. The purchase history is made available to those who wish to confirm their purchases (Milne, 2021).

Such processes will inevitably be a part of the post-Covid world and are already in place in numerous countries. These unmanned stores also address manpower challenges. Cashierless stores can run 24 hours per day without having to put staff on shift work. While many jobs were cut during the pandemic in general, paradoxically, retail businesses handling food and daily necessities continue to suffer manpower constraints. Unlike other retail businesses, those dealing with daily necessities have continued growing despite the pandemic (Ganesan, 2021). The value of grocery retailers in Malaysia was estimated at RM71.08 billion in 2020 and is projected to jump 30% to RM91.79 billion by 2025. This year, the total is already expected to expand to RM74.74 billion (Euromonitor International, 2021).

With the growth of the grocery retail market, establishing business models that support new lifestyle patterns are feasible and necessary. Improvements in consumer and operational flowlines to include social distancing efforts and the removal of checkout points as possible vectors will be a necessary step in creating safe grocery shopping environments. Cashierless shopping will also be a substantial move in making Penang a smart state.

Importantly, this technology is also easily retrofitted into existing stores.

A Worldwide Phenomenon

Tesco has already converted its branch in High Holborn, London, into its first fully autonomous grocery store allowing customers to shop and pay without using a checkout. Customers now only need to check into the store using Tesco's app, pick out what they need, and leave without passing any cashier (*BBC News*, 2021).

The new system, known as GetGo, is similar to stores opened by Amazon, known as Amazon Go in several locations in the United States, and six 'Just walk out' stores in London. Amazon initially rolled out the technology in 2018 in Seattle. In June 2021, it opened its largest-yet full-size grocery equipped with its 'Just walk out' system, sprawling across 2,300 square metres (*The Star*, 2021). Aldi UK is also experimenting with this technology while Sainsbury's trialed its first till-free store in 2019 (McNeice, 2021).

Closer to home, Singapore's Cheers convenience store chain introduced its first unmanned store concept at Nanyang Polytechnic in 2017, followed by two more such stores within the National

University of Singapore. Cheers, which is a subsidiary of NTUC FairPrice, also opened an even more advanced cashierless convenience store at Tampines in 2020 which employs an advanced Artificial Intelligence system that tracks customers' actions, automatically records items removed from shelves, and uses facial recognition technology for payment (Begum, 2020). Similarly, Pick & Go convenience stores, which was founded in 2019, now has three AI unmanned stores, with its latest store located within the National University of Singapore, and spans more than 3,000 square feet (Yu, 2021). These innovations are reflective of the direction the wider industry is heading.

Table 1: Comparison of Cashierless Grocery Stores in Four Countries

	The United States ^{1,2}	The United Kingdom ^{3,4,5}	Singapore ^{6,7,8,9,10}	The Netherlands ^{11,12}
Store format	Grocery stores, compact convenience stores	Grocery stores	Convenience stores	Grocery stores, micro stores
Locations	High traffic sites (transit hubs, office buildings, pedestrian plazas, shopping venues). May expand to airports	Densely populated urban districts, financial and legal districts, and residential and commercial neighbourhoods	Central Business District, university campuses, and community hubs	Pop-up stores at offices, college campuses, and residential sites that do not have shopping centres. 'Grab-and-go' stores at offices, hotel lobbies, and transportation stations

¹ Redman, R. (2021, 24 February). Amazon Go draws high interest from U.S. shoppers. Supermarket News. Retrieved from <https://www.supermarketnews.com/retail-financial/amazon-go-draws-high-interest-us-shoppers>.

² Day, M. (2021, 11 March). Amazon quietly began building a grocery chain during pandemic. Bloomberg. Retrieved from <https://www.bloomberg.com/news/articles/2021-03-11/amazon-quietly-began-building-a-grocery-chain-during-pandemic?sref=DWzi38c2>.

³ Browne, R. (2021, 4 March). Amazon launches its first cashierless store in Britain. CNBC. Retrieved from <https://www.cnbc.com/2021/03/04/amazon-launches-its-first-cashierless-store-in-britain.html>.

⁴ Amazon. (2021). Amazon Fresh. Retrieved from <https://www.amazon.co.uk/b?node=21962024031>.

⁵ BBC News. (2021, 19 October). Tesco opens its first checkout-free store. Retrieved from <https://www.bbc.com/news/business-58951984>.

⁶ Lin, M. (2017, 28 July). Convenience store Cheers opens first unmanned, cashless outlet. The Straits Times. Retrieved from <https://www.straitstimes.com/singapore/convenience-store-cheers-opens-first-unmanned-cashless-outlet>.

⁷ JTC. (2021). Unmanned convenience: Bringing the future of retail to Jurong Island. Retrieved from <https://www.jtc.gov.sg/news-and-publications/featured-stories/Pages/Octobox.aspx>.

⁸ Retail Asia. (2021, 15 April). Singaporean retailer opens three AI-powered unmanned grocery stores. Retrieved from <https://www.retailnews.asia/singaporean-retailer-opens-three-ai-powered-unmanned-grocery-stores/>.

⁹ Pick & Go. (2021). Singapore's first AI unmanned Convenience Store. Retrieved from <https://pickngo.com.sg>.

¹⁰ Loh, D. (2020, 2 January). Singapore's unmanned convenience stores study China's failures. Nikkei Asia. Retrieved from <https://asia.nikkei.com/Business/Retail/Singapore-s-unmanned-convenience-stores-study-China-failures>.

¹¹ Redman, R. (2019, 24 September). Ahold Delhaize pilots Amazon Go-style portable store. Supermarket News. Retrieved from <https://www.supermarketnews.com/retail-financial/ahold-delhaize-pilots-amazon-go-style-portable-store>.

¹² Pinhammer, J. (2021, 3 March). Wundermart offers shopping a la Amazon Go. The Retail Optimizer. Retrieved from <https://retail-optimiser.de/en/wundermart-offers-shopping-a-la-amazon-go/>.

	The United States ^{1,2}	The United Kingdom ^{3,4,5}	Singapore ^{6,7,8,9,10}	The Netherlands ^{11,12}
Retail companies	Amazon	Tesco (GetGo), Amazon, Aldi	Cheers (NTUC FairPrice), Pick & GO, Octobox	Wundermart, Ahold Delhaize (Albert Heijn), Aldi
Technology involved	Scales, shelf cameras, sensor technology, smart shopping carts. Entry gained with mobile app through a turnstile	Overhead cameras, weight sensors, deep learning technology, virtual cart, QR code in mobile app	Facial recognition, or scan QR code from app, biometric palm reader (touchless), RFID. Entry into store after mode of payment is provided	Edge computing, scalable sensor fusion technology. Entry gain on scanning store app or swiping credit card at a kiosk
Status of implementation	Amazon Go opened to the public in 2018, now available in 26 locations. 7-Eleven piloted cashierless store for employees in early 2020	Tesco has trialed the frictionless technology in its Welwyn Garden City headquarters since 2019. Its first GetGo was launched in October 2021. Amazon launched its first cashierless grocery store (Amazon Fresh) in London in March 2021, and have six stores to date. Aldi launched a till-free shop in September 2021	First unmanned Cheers store launched in 2017; there are four stores to date. First Pick & GO store launched in October 2019; three outlets in universities, CBD outlet opening in November 2021. Octobox launched in August 2019 in NUS, planning expansion to gyms & residential enclaves	AH to Go (Albert Heijn) piloted by employees in 2019, is currently testing technology at Schiphol Airport. Aldi plans to open its first checkout free store to the public in early 2022. Wundermart runs 70 cashierless ‘grab-and-go’ compact stores
Store size	Typically 1,200 to 2,700 square feet. Up to 13,000 square feet (Amazon Go Grocery)	2,500 square feet (Amazon Fresh)	1,066 square feet (Pick & GO in NUS)	50-200 square feet (‘AH to Go’ mobile compact stores), Aldi plans to open a cashierless store spanning 4,300 square feet

	The United States ^{1,2}	The United Kingdom ^{3,4,5}	Singapore ^{6,7,8,9,10}	The Netherlands ^{11,12}
Technology provider	Amazon	Amazon, Trigo	Cloudpick, collaboration with Visa	AiFi, in collaboration with Dutch bank ING, Trigo
Supported product line	Full grocery range	Hot food, fresh produce, meal deal, pre-packaged items, coffee machine, age restricted items (staff will check ID)	Food and drink products, daily essentials, stationery, beauty products. No cigarettes or alcohol	Ready-to-eat foods, snack, convenience-focused meals, beverages, focus on healthy fare

Notes:

i. Non-exhaustive list

ii. Amazon is an American multinational company which focusses on e-commerce, cloud computing, digital streaming, and artificial intelligence.

iii. Trigo is an Israeli start-up which provides technology solutions that powers grocery stores with frictionless checkout and digitized operations.

iv. Cloudpick is an unmanned retail technology company headquartered in Shanghai which provides AI-based smart store solutions to the retail industry.

v. AiFi is an automated retail technology company headquartered in California with a computer vision platform for autonomous brick-and-mortar stores.

vi. Apart from the data presented in Table 1, there are many more cashierless store initiatives to be found in 2021. For example, Zippin, a checkout-free technology company based in San Francisco has launched an unattended convenience store at a hotel in Japan.

Source: Author's own compilation.

Issues of theft

Only people who have registered their payment cards, e-wallet accounts, and/or store app will be allowed through the gantry gates of cashierless stores. To ensure security, shoppers are not able to activate the app or enter the store before having added their mode of payment. Customers will similarly need to walk through gantry gates to leave the store. Cashierless stores are equipped with strategically multiple strategically placed cameras, making it easy to identify shoplifting and other misconducts within the store.

Declining jobs for people

An issue which will be questioned with cashierless stores is the loss of employment. However, humans are still needed in these cashierless stores to do a variety of things such as helping customers, preparing food, handling quality checks, replenishing products and more. Manpower will in fact still be needed but will be utilized in a different manner.

Discrimination with customers

Not all customers have smartphones where they can download the store's app or have credit cards and/ or bank accounts. There must still be an option for manual entry and cash payments for customers who choose to shop the traditional way. In Singapore's Cheers cashierless stores, the Cheers SG app can register more than one person. This means that people who are not tech-savvy, children, and the elderly who do not have a smartphone or credit card can still enter the store and buy items, as long as their family member's app has their facial biometrics recorded. The items will be charged to their family member's registered credit card.

Policy Recommendations

1. Encourage the use of cashierless shopping technology to grocery industry players

A move to introduce cashierless stores in Penang will revolutionize the way retailers and consumers interact with technology. The State Government will need to work with grocery industry players towards bringing in cashierless technology as soon as possible, as the state works towards becoming a smart state. Additionally, the sooner the technology is introduced to the state, the better; cashierless grocery stores will stave virus spreading as more and more people head out to physical stores once again.

2. Collaborate with all stakeholders

The State Government needs to collaborate with all stakeholders to expedite the adoption of such technology in the state. It needs for example to approach big grocery industry players in Penang such as Charoen Pokphand Group (Lotus's), AEON Group, GCH Retail (Mercato and Cold Storage), as well as companies running convenience store chains in the state such as 7-Eleven Malaysia Holdings Berhad and Maxincome Resources Sdn Bhd (FamilyMart), to discuss converting their outlets to pilot the cashierless technology.

The State Government also needs to partner up with experienced solution providers specializing in equipping physical stores with the necessary technology for checkout-free systems. It would also be ideal to coordinate with e-commerce companies, banking and financial services companies, and mobile development companies for a successful installation of the technology throughout the state.

3. Education to consumers

Digital literacy is at the forefront of the State's agenda. It is recommended that the State, through Digital Penang, continues encouraging digitalization in the lifestyle of its people through more exposure to smart technologies. It would be ideal that education about such technologies are made easily available and kept simple.

Transparency about data privacy when the technology is made available to the public will also be important in order to gain the trust of consumers.

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