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# 'COPS and Robbers': Customer operated payment systems, self-service checkout and the impact on retail crime

## Introduction

'It's still stealing. It's still a crime and if we catch you, or you get caught, you will be charged' asserts an Australian police officer (cited in Hunjan, 2016: n.p.). The admonition came as part of a police crackdown on people who behave dishonestly when using the self-service checkout in Australia. The police made the announcement in response to revelations that customers were routinely using the self-service checkout (SCO) to underpay, or not pay at all, for goods, to the extent that it was becoming normalised (Taylor, 2016a). While the traditional staffed checkout will in all likelihood continue for the foreseeable future, other payment methods are becoming increasingly popular and it is predicted that the use of emerging technologies in the supply chain and at the point of sale (POS) are set to dramatically change the process by which products pass from retailer to customer. Drawing on international examples and secondary data, this chapter examines the impact that customer operated payment systems (COPS) are having on the retail industry, and in particular on crime. Organised broadly into four parts, it first provides an overview of new developments in COPS and maps their future trajectory, exploring the emergence of SCO, scan-as-you-go, and mobile payment systems. It then turns to mapping the known impact on customer theft before outlining some of the key concerns and vulnerabilities about their implementation, drawing upon the emergence of the 'SWIPERS'. The final section considers the future of point of sale (POS) technology, including sensor-based retailing, and the impact on retail crime, providing recommendations to the industry on how to embrace customer autonomy in the age of automation and deliver retail solutions that are cognisant of potential vulnerabilities and risks.

## Background: New developments in POS

A range of new sophisticated technologies hold promises of more efficient and speedier payment processes, as well as facilitating add-on services such as 'endless aisle', enabling the integration of e-tailing with physical stores. Such 'clicks and mortar' models have been asserted by some to not only be beneficial for retail, but to be 'a strategic necessity' (Bernstein, Song and Zheng, 2008: 671). One of the key drivers of customer operated payment systems (COPS) and automated POS, however, is the prospect of significantly reducing the expense associated with employees, reputedly the most costly disbursement for the majority of retailers (Orel and Kara, 2013). For example, Wal-Mart has estimated that it could save $12 million for every second it can reduce from the duration of the staffed checkout process (White, 2013). In addition to financial and efficiency savings, it has been claimed that customers are now demanding a shift in processes manifested in 'a growing

consumer desire for an omni-channel shopping experience, where the speed and personalization they receive online is delivered in an increasingly self-service manner in the store' (Cisco Systems, 2013). In recognition of this, and in conjunction with significant technological innovations, it is little wonder that there has been a shift towards customer-operated systems and a growing use of automation in the retail sector.

Self-service check out (SCO) terminals were first introduced 25 years ago, in 1992, in the U.S. They have since become a familiar part of retailing, particularly in supermarkets, across the globe. In essence, SCO refers to a machine, or cluster of machines, with a scanner and digital interface that allows customers to pay for services or goods without direct employee assistance (unless required). The onus is on the customer for scanning items they wish to purchase and then paying for them using an interactive operating system. SCO machines typically have a barcode reader, a weighing scale for loose purchases such as fruit and vegetables, a 'bagging area' (often also utilising scales to verify that the correct item and quantity was placed in the bags after scanning) and a payment system, usually accepting cash, cards and vouchers, and increasingly also payments via mobile phone (Taylor, 2016b). In many ways the introduction of SCO significantly altered the relationship between retailer and customer - no longer was the customer a passive recipient of a service, but was now relatively autonomous in the picking, payment and packaging of the goods they wished to purchase. It is not insignificant, however, that the transferral of responsibility for the checkout process to the customer relinquishes control at the most crucial point of the shopping experience: point of sale. Entrusting customers with the responsibility for processing an honest and correct transaction not surprisingly resulted in considerable scepticism and concern that huge losses, both deliberate and accidental, would follow. However, despite early reservations, SCO has become an increasingly common feature of retailing; some stores have even become fully self-service.[1] The number of SCO terminals installed globally has been predicted to increase from 191,000 in 2013 to reach nearly 325,000 by 2019 (Retail Banking Research, 2014). It has become evident that self-service payment solutions are an enduring feature of the contemporary shopping experience, and one that looks set to further push the boundaries of technological sophistication, particularly in terms of automation.

Although SCO began to diversify payment options, they didn't alleviate queues in supermarkets to the extent that many had hoped, arguably due in part to the simultaneous reduction in staffed checkout lanes. The checkout process was still often beset by long queues and some customers reported irritation with the interface. Triggering the dreaded 'unexpected item in bagging area' or requiring a harried staff member to authorise the purchase of alcohol or validate that you have indeed brought your own bags were vexatious for customers who were seeking a smooth flowing checkout process. So much so, that some argued that such frustrations were potentially a crime precipitator, justifying criminal behaviour amongst otherwise honest customers (Taylor, 2016a). In a bid to streamline the process of self checkout, 'scan as you go' approaches began to emerge in 2011. In the US, many stores, including *Walmart*, *Kroger* and *Stop & Shop* have been trialling mobile scanning technology. The UK's largest retailer, *Tesco*, is investing in the rollout of its 'scan-as-you-go' system, which at the time of writing was available in nearly 350 stores across the UK, representing one of the largest investments in this approach to COPS. In addition to large companies developing their own self-scan technologies, there are numerous start-ups that are now

[1] In June 2010 a Tesco Express in Northampton became Britain's first self-service only store. It had five self-service checkouts overseen by a single member of staff and no staffed checkouts. Tesco described it as an 'assisted service store' (ASS), designed to increase efficiency.

emerging to sell apps to smaller retailers such as the *Selfycart* app which allows customers to use their own mobile device to scan items, pay and then leave the store without needing to wait in a line or interact with staff. In essence, the premise of 'scan-as-you-go' is that shoppers use their mobile device or a store provided portable device to scan items as they are selected off the shelves. Customers can pack the produce directly into their bags as they move around the aisles, thus preventing shoppers congregating at designated checkouts at the end of their shopping trip to unload their goods, scan them, pack them in grocery bags and then pay for them. There are significant benefits to the customer journey relating to such a streamlined process, but also considerable risk to the retailer.

In order to retain some control over the customer journey and build-in payment checks, currently, scan and go requires customers to be channelled through certain points (checkouts or kiosks for example) in order to process payment thus providing a common 'touch point' to validate the transaction and ensure an accurate payment. In terms of preventing dishonest behaviour amongst customers, most adopters currently have randomised checks to verify if a customer has paid for all of the items in their bags. It is perceived that the potential for being selected for this check will assuage temptations to steal. For example, Tecso's system is underscored by random checks as outlined on their website: 'the Scan as you Shop system will prompt us to check a few products at random in a customer's trolley' (Tesco, 2017). However, as will be explored later in this chapter, customer operated payment systems can potentially create new opportunities for aberrant consumer behaviours.

Relatedly, and following on from the mainstreaming of SCO and the shift towards hybrid e-commerce, mobile payment has emerged within retail. Encompassing a vast array of nuanced scenarios, terms such as 'mobile payment', 'mobile commerce' and 'contactless payment' are often used interchangeably but have some distinct attributes . A 'mobile payment' refers to any transaction in which a mobile device, such as a mobile phone or tablet is used to initiate, authorise and/or confirm an exchange of financial value in return for goods and services. More specifically, a mobile payment has been defined as:

> [A] type of electronic payment transaction procedure in which at least the payer employs mobile communication techniques in conjunction with mobile devices for the initiation, authorization or realization of payment (Au and Koffman, 2008: 141)

There are a variety of different types and approaches to mobile payment, but the technology facilitating the transaction can broadly be categorised into two main types; remote cloud based digital payments and proximity payments. Remote payments require customers to register for a service, usually involving the download of an application, and use it on their mobile device to pay for goods and services. Customers may have pre-loaded value stored in an account or draw funds directly from a bank account. Payment service providers (PSPs) such as Google, PayPal, and GoPago use a cloud-based remote approach to in-store mobile payment. Proximity payments require the customer to present a credit card, mobile phone or tablet device at a payment terminal, holding it close to the receiver in order to complete the transaction. The payment is facilitated by Near Field Communication (NFC) and is commonly referred to as a 'contactless payment'. In attempt to further clarify distinctions within the mobile payments market, the differences between three key approaches - mobile commerce, mobile acceptance and mobile wallets - are outlined below.

The term *mobile commerce* is typically used to describe any form of e-commerce that is carried out using a mobile device, such as a mobile phone or tablet, via digital wireless

technology, whereas *mobile payment acceptance* refers to the conversion of a mobile device (e.g. smart phone or tablet) into a POS system by affixing temporary or permanent hardware enabling the retailer to accept card-based payments. For example, a store device, such as a magnetic strip reader, can be connected to a customer's smartphone, often via the audio jack, to create an external bar code scanner or to process payment from a debit or credit card. The *mobile wallet* can be used to refer to an application hosted by a mobile device, or attaching a sticker containing a microchip, that enables customers to use it for payment instead of a credit or debit card. Many different wallet providers exist and large retailers and banks have been developing different approaches - some using proximity technology such as near-field communication (NFC), either embedded in the device or a sticker, while others are remote or cloud-based.

Available information and research on multichannel retail and mobile payments has largely focused on the positive marketing and sales opportunities they potentially offer to industry and customers. Following a review of the literature, Groß (2015: 232) concluded that most research studies 'suffer from a pro-innovation bias', and furthermore, in order to 'overcome that deficit, potential obstacles have to first be identified'. Despite consistent findings 'that consumers are highly sensitive to issues of […] risk, privacy, network security, transaction protection, and trust' (Groß, 2015: 226), there exists little available information relating to best practice, and virtually nothing pertaining to the impact on criminal behavior. There is little understanding of the risks involved with m-shopping, particularly in terms of shrinkage and fraud as very little independent research has been conducted to understand the vulnerabilities of new shopping practices and payment. It has been argued that the use of smartphones as payment devices may actually decrease the risk of customer theft from retailers, since authentication and authorisation processes may become more sophisticated than those of existing payment methods (Medich et al., 2011). However, on the other hand, they might present new opportunities for fraudulent behavior, particularly in the early days of implementation (Taylor, 2016b).

In addition, understanding of customer views and experiences of new payment technologies remain relatively unexplored. While it is believed that some customers enjoy the use of new technologies and welcome the opportunity for greater control over their shopping experience, others report feelings of frustration and resent the replacement of store clerks with automated machines. A survey for computer maker Ordissimo revealed that some customers rank the emergence of SCO as one of the most irritating features of modern life (Simms, 2012), whereas some retail scholars have lamented that it is indicative of a slippery slope towards poorer customer service (Evans and Dayle, 2009). It is clear that the benefits and limitations of SCO, as well as the integration of physical and e-commerce channels, for retailers, customers and thieves are complex; but a key area that requires further exploration, and the focus of the following section, is the impact that new COPS are having on shrinkage and, in particular, shoplifting.

**Shrinkage, Retail theft and Customer Operated Payment Systems**

Costing the retail industry an estimated USD $119 billion each year, shrinkage is typically broken down into four categories: internal theft, external theft, administrative errors, and inter-company fraud. There is little consensus on which of these accounts for the most loss. For example, the most recent Global Retail Theft Barometer (GRTB, 2015) found that shoplifting was the key cause of shrinkage in Europe, the Asia Pacific and Latin America in 2013/14 and 2014/15, while in North America, dishonest employee theft was reported to be

the main contributor. Focusing in on external (customer) theft, or 'shoplifting', defined as 'theft from the selling floor while a store is open for business' (Francis, 1979: 10), this category is also considerably opaque. The British Retail Consortium's (BRC) *Retail Crime Survey 2015* indicated that although customer theft in volume terms decreased marginally by 2 percent in 2014-15 (in part due to the elevated level the previous year[2]), the financial impact of customer theft increased by 35 per cent in 2014-15, reaching the highest average value recorded since 2004-05. The average value of customer theft increased from £241 per incident ($293 USD)[3] to £325 ($395 USD) per incident; 'a record high' (BRC, 2016: 5).

The precise rate of retail theft is actually unknown. Shoplifting is considered to be one of the most abstruse crimes in terms of verifiable knowledge about perpetrators, motivations and modi operandi. Quite simply, only a small proportion of shoplifters are apprehended and prosecuted. Griffin (1984) estimated that just 1 in every 20–40 shoplifters are apprehended, whereas according to Williams, Forst and Hamilton (1987) the typical offender engages in approximately 95 offences prior to apprehension. This makes it difficult to understand the true characteristics of this crime type, as well as the motivations and demographic profile of offenders.

As with the opacity that characterises shrinkage composition, the exact impact of COPS on rates of shoplifting is unclear. There have been anecdotal claims that self-checkout increases theft by up to five times compared to cashier-processed transactions (Krasny, 2012), whereas others have averred that it actually has little 'discernible impact upon the overall rate of shrinkage' (Beck, 2011: 205). Research findings from one study suggested that, following the introduction of SCO, customers were 'much more likely to consistently scan items they are presenting for purchase than members of staff operating staffed checkouts' (Beck, 2011: 205). However, it is not known whether this finding is susceptible to changes over time. For example, it is conceivable that initially customers are very careful and precise about scanning their items, perhaps feeling more scrutinised when the SCO machines are first introduced, but as they become more familiar and *au fait* with the technology, the concern for a correct transaction reduces. As will be outlined below, some individuals who habitually steal using self checkout first did so accidentally, but upon realising how easy it was continued to steal regularly. This would suggest that over time the level of theft at the SCO would increase. In another study, the UK Home Office's Commercial Victimisation Survey (CVS) has found that supermarkets with self-service tills are significantly more likely to experience shoplifting than those without. Including questions specifically relating to SCO for the first time in 2014, the CVS findings reported that 86 per cent of those with self-service tills were victims of shoplifting, compared with 52 per cent of those without (Home Office, 2015).[4] The findings from the survey suggest a strong correlation between SCO and higher levels of shoplifting; furthermore it does not appear to represent 'tactical displacement' (Repetto, 1976), whereby

[2] The annual number of customer thefts per 100 stores had increased by 5 per cent from the 2012 rate, and that 2013 had the highest number of shop thefts in the past nine years (BRC, 2014). While some may interpret this as symptomatic of an overall upward trend in the occurrence of customer theft, it could also be read as a growth in the number of offenders being apprehended and prosecuted, and thus simply a greater uncovering of the dark figure.

[3] Conversions as at January 2017.

[4] In the 2015 CVS respondents were additionally asked what proportion of shoplifting incidents they thought occurred at a self-service till. However, due to the small sample size, only 35 premises with self-service tills that had experienced theft by customers and were therefore asked the follow-up question. The analysis determined that this base was too low to derive reliable findings, but efforts will be made to report on this data in future years (Home Office, 2016).

those of criminal intent simply steal by a different means, since, if this were the case, there would be no real net change in the amount of store theft. Despite assumed benefits for retailers and shoppers, SCO undoubtedly presents a number of challenges in terms of controlling losses that may arise from its use, both malicious (for example, customers deliberately not scanning items) and non-malicious (for example, incorrect prices accidently being transacted or aborted sales due to customer frustrations).

## COPS and Robbers: Opportunity makes the thief?

There are many different techniques used by shoplifters (see Hayes and Cardone, 2006; Gill, 2007 for an overview of commonly used strategies) that are arguably 'limited only by the imagination' (Hayes and Cardone, 2006: 305). A rough distinction can be drawn between techniques that attempt to conceal the item to be stolen, and those that do not. Many studies show that concealment usually occurs throughout the store; in the aisles or in a blind-spot (Gill, 2007), and not at the checkout where security mechanisms such as CCTV are often concentrated. However, with the advent of SCO, a range of different techniques have materialised that are particular to customer operated systems. For example, manipulating the weight scales so that the amount of product registers as less, selecting a different, cheaper item for loose goods such as fruit and vegetables, stacking items so that only the bottom one is scanned, and even bypassing the machine altogether. This raises the question whether the introduction of self checkout has resulted in a new type of shoplifter that would not steal by any other method. This new type of customer-turned-thief are referred to by the mnemonic 'SWIPERS' being, 'Seemingly Well-Intentioned Patrons Engaging in Routine Shoplifting' (Taylor, 2016a).

### *SWIPERS*

A number of industry studies and market research, typically surveys of customers, have provided some support for the initial findings from the UK Home Office's CVS, revealing that SWIPERS appear to represent a growing cohort of store thieves. Online survey findings suggest that almost a third of customers admit to stealing when using a SCO machine (Harding, 2012), and for some it was a behaviour that they engaged in regularly (Carter, 2014). The average value of goods has been estimated to be £15 ($18 USD) per month, adding up to £1.6 billion ($1.95 USD) worth of items every year. Synthesising the findings from different surveys, the main reasons for stealing when using the SCO given by participants can be broadly categorised into three: ease (dishonest behavior at the SCO requires little effort or skill); low risk (perceived low likelihood of detection and apprehension); and frustration (for example, problems with the system, along wait time, or requiring a staff member to intervene e.g. for age-validation).

The SCO machines can be deliberately manipulated in many different ways. A customer could switch barcode labels or select a less expensive item within a similar grocery category for loose purchases. For example, cooking tomatoes are often much cheaper by weight than those on the vine, peanuts are cheaper than pine nuts, carrots are cheaper than cherries, and so on. Other techniques include stacking items together so that only the barcode on one unit is scanned, entering the wrong quantity or size of loose items e.g. selecting a small salad bowl instead of a large one, and covering the barcode while imitating the scanning motion so that the item is not registered. It has also been suggested that SCO increases the occurrence of 'walking'. In this scenario the customer deliberately exits the store with goods they have not paid for without any attempt to make payment at a staffed or self service lane (Bamfield,

2012). This relatively brazen shoplifting technique is aided by the fact that the SCO area is often designed to enable the rapid and free flowing movement of multiple customers simultaneously, prioritising fluidity over security. In addition, reduced staff presence in turn diminishes the number of capable guardians that are able, inclined and willing to intervene in the theft of goods. The self-service area may therefore permit thieves to exit more easily, particularly if employees are occupied with another customer. Research has shown that thieves will deliberately create a disturbance or distract store staff in order to enable an accomplice to steal items unnoticed (for example, see Bamfield, 2012; Gill, 2007). At the SCO this is easily done by requesting assistance from a staff member, thus allowing an accomplice to walk out of the store without being apprehended. Some retailers have attempted to counter this by installing gates that will only open to permit exit if a valid receipt is scanned.

In a previous publication (Taylor, 2016a), I developed a typology of SWIPERS outlining four main groups: the *accidental* thieves, the *switchers* of labels, those *compensating* themselves, and those that steal professedly due to becoming *frustrated* with the process of self checkout. These categories are synthesised below.

*Accidental SWIPERS*

It is likely that many SWIPERS originally misappropriated goods by accident, but upon realising how easily they had got away with, they continued to steal regularly. Hechter and Kanazawa (1997) claim that individuals who are not apprehended or punished for stealing are likely to revise down their risk assessment and continue to commit the crime, thus creating a symbiotic spiral of escalating criminality. Providing some support for this in relation to SCO, an online survey found that 57% of those admitting to theft when using self scan machines, claimed that they first stole goods by accident or because they couldn't get an item to scan. Importantly, these individuals continued to steal regularly following a perception that it was easy and relatively low risk. The small chance of being apprehended alongside the perceived ease of stealing via SCO provides an important insight for understanding the genesis of SWIPERS.

*Switching SWIPERS*

It has become apparent that some shoppers deliberately switch the labels on products or attempt to transact more expensive, lighter items (such as cherries and grapes) as heavier loose items such as potatoes, onions or carrots. It has been suggested that perpetrators of this kind of 'discount theft' would not ordinarily steal, would not consider shoplifting by any other modus operandi and do not necessarily even view their actions as theft. Rather this behavior is perceived as 'cheating' the system rather than stealing; 'a means of gamifying an otherwise mundane and pedestrian experience' (Taylor, 2016a: 559). Furthermore, since switchers do pay *something* for the goods, they often do not consider it to be 'real' theft, supporting Cameron's assertion that 'pilferers… generally do not think of themselves as thieves' (1964: 159).

*Compensating SWIPERS*

It costs an estimated USD $1 to check out a USD $100 spend (IBM, 2008). Thus losses through customer theft might overall be cheaper than the cost of paying cashiers (particularly since employee theft represents a significant amount of loss). However, since SCO usually

results in fewer staff and more profits for the retailer, this could, to some, provide justification for theft. Schwartz and Wood (1991) identified a cohort of shop thieves motivated to steal through a sense of entitlement and the contention that retail theft was a political act. These shoplifters believe that they have been treated unfairly in some way (perhaps they are unemployed and resent the automation of some jobs, or they have been dismissed from a similar role), or they hold anti-corporation beliefs that in their view justify stealing from large companies. In addition, there is evidence to suggest that some customers believe that they should be 'compensated' for having to process their shopping themselves when hitherto someone would have been employed to do the same task, particularly if they encountered difficulties during the transaction or a long wait in line.

*Irritated/frustrated SWIPERS*

As mentioned above, a survey of shoppers in Britain (Simms, 2012) found that SCO was considered to be one of the most irritating features of modern life. Another survey of 1017 adults in the UK identified precisely what was most annoying about SCO machines; the automated voice announcing 'unexpected item in the bagging area' and store assistants being slow to respond to problems topped the poll (Arnfield, 2014). Similar to the Compensators, those who steal through frustration believe it is a justifiable action in response to their experience at the store, and draw upon a range of excuses, or what Sykes and Matza term 'techniques of neutralization' (1957) to defend their behaviour. Such justifications often include: 'the item wouldn't scan', 'the barcode was damaged' and 'I couldn't find the correct fruit/vegetable'. It is difficult to know how far these are genuine difficulties and the customer originally intended to pay for the item or whether SCO has invited this type of post hoc excuse making, also found amongst other property offenders (e.g. Taylor, 2014).

*Pleasure-seeking and hedonic shoplifting*

It would be imprudent to assert that all crimes are driven by rational motives. Of course, some retail crimes are committed for more 'existential' or visceral reasons, such as the pleasure derived from illicit behaviours or the adrenalin generated by transgression (see Taylor, 2016c). This cohort is not categorised as SWIPERS since they cannot be considered to enter the store 'well-intentioned'. Customer operated payment systems potentially provide a relatively 'safe' way to derive pleasure from shop theft. Previous research has shown that paying a reduced price for a particular item might lead a consumer to feel proud, smart, or competent and so the experience of paying a lower price through 'discount theft' could be similar to the hedonic reactions that some, such as Holbrook et al. (1984), found amongst bargain hunters. Others have reported that, if a customer believes they have obtained a bargain, it 'can provide increased sensory involvement and excitement' (Babin, Darden and Griffin, 1994: 647). Furthermore, it has been suggested that this type of deviant customer behaviour is not abnormal, but rather 'an inseparable part of the consumer experience' (Fullerton and Punj, 1993), to the extent that some claim the shoplifter is simply the 'ultimate frugal consumer' (Tuck and Riley, 1986). Seeing theft as pleasurable provides some understanding as to why it is that shoplifting is not solely the preserve of economically and socially disadvantaged groups stealing for subsistence.

Clearly, much more research is required in order to understand who steals using the self service checkout and what their motivations are for doing so. But the scant evidence available would suggest that as COPS make things easier for legitimate shoppers, they might also be creating opportunities for 'aberrant consumer behaviour' (Bamfield, 2012: 39).

**Future directions for COPS and POS technology**

The onus for an accurate and honest transaction rests with the customer in many of the early COPS and POS technologies, and, as has been demonstrated, this potentially provides new opportunities for dishonest behaviour, particularly of concern is that this might be resulting in customer theft being committed by some individuals who claim that they would not steal through any other means. Retailers and law enforcement need to take steps to counter the seeming impunity that those dishonestly using the self-service checkout appear to have developed. As outlined in the introduction to this chapter, police in Australia are attempting to remedy this through crackdowns and taskforces, recognising that although each theft might be relatively small (although apparently increasing in value), the sheer volume amounts to a huge dent in retailers' bottom line. In a bid to deter this behaviour, one police officer stated: 'You're very vulnerable to being caught for committing this kind of offence no matter how small you think it is' (cited in Hunjan, 2016: n.p.). Such statements from the police can have a deterrent effect on opportunistic individuals who hitherto perceived stealing at SCO to be a relatively risk free pursuit. The support of law enforcement to assist in tackling customer theft is paramount. As the British Retail Consortium has asserted: 'ensuring that theft receives an appropriate response from the police remains an important priority for businesses' (2016: 4). However, there is clearly a role for retailers too, in ensuring that the technologies that they develop and implement do not result in increases in criminal behaviour. As Beck and Hopkins (2016: 14) have argued, retailers 'should take greater moral and social responsibility to mitigate the wider "criminogenic" impacts of technological innovation through their Corporate Social Responsibility (CSR) strategies.'.

In terms of the technology being used to enhance the customer journey and facilitate in store purchasing, there are set to be further revolutionary shifts in the near future. Since customer-owned mobile devices and cloud-based applications have the ability to be processed anywhere that the device has a signal, developing a truly fluid and autonomous shopping experience looks set to be the next step in retail. A fully automated shopping and checkout process could eradicate cumbersome queues and the packing and unpacking of purchases altogether. Pioneering this innovation, in June 2016, Amazon launched its Amazon Go concept store with its 'Just Walk Out' approach to shopping. Using the 'the same types of technologies used in self-driving cars: computer vision, sensor fusion, and deep learning … Amazon Go is a new kind of store with no checkout required' (Amazon.com, 2017). The concept is explained as follows:

> With our Just Walk Out Shopping experience, simply use the Amazon Go app to enter the store, take the products you want, and go! No lines, no checkout … Our Just Walk Out Technology automatically detects when products are taken from or returned to the shelves and keeps track of them in a virtual cart. When you're done shopping, you can just leave the store. Shortly after, we'll charge your Amazon account and send you a receipt.

Amazon has not released any information about the accuracy of the technology or the volume of incorrect transactions e.g. a customer being charged for an item they did not leave the store with, or vice-versa, not being charged for an item that they did take. Nor do we know how or in what way the technology can be maliciously manipulated. In addition, it is not known how the precision with which the technology can discriminate between similar but different items. But what is interesting is that the 'Just Walk Out' concept potentially eradicates theft. In fact,

it encourages the exact behaviour that is associated with shoplifting; an individual picks an item off the shelf, puts it in their bag and leaves the store without visiting a register or POS station. If the technology is a success, stealing from these stores would be made very difficult. Even if possible to circumvent, the likely augmentation with biometrics such as facial recognition and artificial intelligence is likely to assuage even the most discerning thief.

## Conclusion

The retail landscape is constantly evolving and the transition to customer operated payment systems has revolutionised the relationship between retailer and customer. The initial shift was to enable customers to scan their own items at self-checkout stations. This was then expanded to 'scan and go' concepts that removed the bottleneck of scanning at these stations, but retained the fixed points for making payment, as well as the somewhat awkward random bag and receipt validation checks, which understandably could irk honest customers by making them 'feel like criminals'. The next phase appears to be smartphone tracking and sensor-based retail as currently being pioneered by Amazon. While this could raise significant privacy and data protection concerns amongst some customers, as well as generate ideologically-driven resistance from some individuals who lament the replacement of human staff with algorithms and machines, it is likely to be zealously received by technophiles. The key to its success will be in the accuracy of the technology to ensure that transactions are correct. In the meantime, SCO and 'scan and go' customer operated payment systems will continue to evolve. In order to mitigate loss, retailers need to be aware of the techniques used at self service checkouts, and the range of justifications for dishonest behaviour that have become well-established. Reliable data collection and measurement of retail theft is crucial to tackling it effectively.

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