

MOBILE POINT-OF-SALE AND LOSS PREVENTION: AN ASSESSMENT OF RISK



RESEARCH REPORT

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Letter from RILA

RILA and University of Arkansas' study on Mobile Technology in the Retail Store brings together the industry's leading retailers, consumer product manufacturers and solution providers to examine the potential risks of a still emerging technological innovation and explore possible methods for mitigating risk.

Through qualitative interviews and focus groups with shoppers, thieves and industry experts, site visits, store intercepts, quantitative surveys and action research, insights were captured from asset protection executives with decades of retail experience as well as from key external constituents. The final framework reports on risks from five perspectives: customer, technology, retailer/store, employee and product.

The findings contained in this report are the most comprehensive of any similar study to date. Findings reveal key risks in each of the five categories including: (1) customers' tolerance for validation in the form of exit inspections; (2) non-scans, battery-life, EAS device removal and deactivation, wireless failure, E-receipt delay; (3) large footprint stores with invisible spots, multiple exit points, reduced opportunity to upsell and cross-sell; (4) fear of layoffs, inability to master technology and resistance to change, apathy toward increased shrink; and (5) unique challenges with the sale of bulk items, produce, loose bakery, age-restricted products, identity-required products, and prescriptions.

In addition to research findings, the study includes a helpful risk checklist of possible solutions that can be used to mitigate top risks. We encourage retailers to use the framework, findings, and checklist as a launching pad to investigate their own unique situations and to achieve success with mobility initiatives.

RILA would like to thank University of Arkansas for their collaboration and leadership on this study. RILA would also like to thank Checkpoint Systems and Ernst & Young for their support and their continued commitment to helping retailers achieve excellence in asset protection operations. And, we would like to thank RILA's Asset Protection Leaders Council, and the many retailers, product manufacturers and solution providers who participated in the study. We look forward to continuing our collaboration with retail's asset protection executives as they tackle challenges and take advantage of opportunities in the year ahead.

Best wishes for a great 2014 filled with growth and prosperity,

Lisa LaBruno, Esq.

A handwritten signature in grey ink that reads "LLaBruno".

Senior Vice President, Retail Operations
Retail Industry Leaders Association (RILA)



Executive Summary

This research assessed the risk associated with mobile point-of-sale, a retail innovation that is expected to be implemented in some form by about 30% of all retailers in the US and is under consideration by the majority of the others. In order to fully understand the risks, it was necessary to have a comprehensive and detailed understanding of the eco-system of technological capabilities, retail store attributes, and customer attitudes and beliefs. It was also necessary to understand precisely how the mobile innovation disrupts the transaction processes around which loss prevention is currently designed. We then assessed risk from five separate perspectives: technology, employee, retailer/store, product, and customer.

Deconstructing the Mobile Checkout Process

Mobile technology allows for a fundamental change in location and timing of the traditional sequence of processes—i.e., scanning, payment, and validation—of a checkout transaction. This change as well as the increased customer autonomy disrupts many of the existing loss prevention processes—e.g., video surveillance, employee monitoring of baskets, synchronous scanning and payment, removal of EAS devices—that are embedded in or designed around the transaction process.

Against this backdrop, to better understand how retailers should pursue this emerging technology and benefit from its enormous potential, we developed a comprehensive risk framework using a multimethod approach.

A Risk Framework for Mobile POS

Technology Risk. Technology failures, such as mis-scans, battery-life, wireless, e-receipt delay or failure, are the major concern with technology risks as they could severely erode customer satisfaction. Some technology-enabled detection processes, such as EAS devices, also need process redesign due to the need for an employee to remove the devices.

Employee Risk. These risks may be classified into three categories. First, those that have implications for transaction completion including the need to train employees both to use the new technology and to train them to deal with customers unfamiliar with the technology. Second, there are risks involving the potential

for increased shrink because employees may give information to shoplifters pertaining to the potential weaknesses of the deterrence systems with mobile POS, and because of an increased apathy to shrink given that the transaction is no longer their responsibility. Finally, we observed some concern that technology may replace human labor and thus there were some signs of resistance to the mobile innovation.

Retailer/Store Risk. There are several risks related to the type of retailer and type of store. Larger stores with multiple exit points are hard to monitor. There could be negative effects on customer satisfaction due to decreased aesthetics in stores that use corrals to separate different checkout modes, a decreased opportunity to cross-sell and up-sell because of decreased employee touchpoints, and the risk of erroneous accusation of theft after a genuine scanning or payment error.

Product Risk. There are two difficulties. First, products that do not have barcodes, such as bulk, produce and bakery, cannot be scanned by customers using the normal procedures for other products. Second, products that need age or identity verification, or need to have EAS devices removed also need to have a process built-in for employee involvement.

Customer Risk. We identified two major concerns. First, if due to increased customer autonomy in the transaction, the retailer needs to conduct exit inspections or other quality audits, customers are not tolerant of this sort of transaction validation. Second, some forms of mobile technologies require customer identification (e.g., customers scanning with mobile phones may need to be registered) and we found that customers had a variety of concerns related to their privacy.

The risk framework has been designed as a tool to measure risk from mobile technology. We are confident that retailers who embrace the framework, actively engaging the loss prevention function in the multi-functional project teams working on mobile, are more likely to unlock the full benefits of the new technology. At the same time, taking the proactive steps needed to get in front of the risks and solutions identified in the report will mitigate the risks. The authors look forward to learning about these success stories in years to come.

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INTRODUCTION

Many retailers in the US are either implementing or exploring mobile technologies either for store employees or for customers [2]. These mobility initiatives may be driven by one or more of several factors including the potential to increase customer convenience, the potential to use technology to engage with in-store shoppers as they make their purchase decisions, and the potential for cost savings. Some estimates predict that about 30% of retailers have implemented or will implement mobile point-of-sale (POS) in some form by the end of 2013. They also estimate that mobile POS shipments will cannibalize 12.4% of traditional POS shipments by 2016. However, implementing new technological innovations is inherently risky and could result in harmful consequences that are detrimental to the strategic growth and positioning as well as the efficient operations of retailers.

The retail industry consists of firms that are diverse with respect to their customers, product types and assortments, locations, store footprints, and a host of other factors. Retailers considering a mobile strategy, conducting pilot-tests, and already implementing mobile POS in some form include Apple, JC Penney, Home Depot, Lowes, Nordstroms, Sam's Club, Stop & Shop, Walmart, and many small independent retailers including vendors at farmers' markets and mall-based speciality stores. These retailers and their stores represent a diverse range when considering product assortment, store footprint and layout, customer base, level of service expected and provided, and whole host of other retailer characteristics. The general risk framework in this report provides an organized structure to the risks that may be applied to specific contexts, studied in more depth, and quantified by individual retailers.

As we will detail in this report, we conducted a comprehensive study of the risk and issues associated with this new store innovation – mobile POS. We conducted a day-long focus group with the loss-prevention leadership of several retailers and technology providers. The study included interviews with experts from six of the top ten retailers in

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the US by revenue and several others listed in the top one hundred. These retailers represented general merchandize, supermarkets and hypermarkets, apparel, department stores, DIY/home improvement, drugstores and pharmacies, specialty stores, and warehouse stores. We also conducted interviews and site visits with several technology providers, including security, surveillance, and EAS device providers and point of sale system vendors. The site visits included among others, two of the global leaders in security systems, one of the global leaders in POS systems, and a European future-store that is a laboratory for retail innovation. To gain a systems level perspective, we interviewed two consulting firms with expertise in the mobile payment industry. To gain a ground-level view, we conducted action research by visiting several retail stores around the country that have already implemented or are piloting mobile POS and walked through the process as customers. On the customer side, we conducted store intercepts at three major retailers to capture customer attitudes and beliefs toward mobile innovations in the store. We also conducted a focus group with shoplifters, and analyzed data from a survey of shoplifters who had been apprehended and data from a focus group of habitual offenders. Appendixes 1 and 2 provide the details of our research method.

From these several research activities, we identified existing and emerging mobile POS scenarios in the retail industry. These included customers scanning products with their mobile phones, employees scanning products with mobile devices on the sales floor, customers processing payments with mobile wallets or with electronic credit cards, employees processing credit card payments on the sales floor and many other variations. From these several current and emerging scenarios, we identified three separate processes that need to occur for a successful transaction and record of that transaction – item scanning, payment for a basket of items, and validation of the transaction. We analyzed characteristics of these scanning and payment process scenarios – were they fixed or mobile location, and also were they employee assisted, unassisted, or automated. Based on these characteristics, we identified six separate types of scanning and six separate types of payment scenarios – for a total of 36 separate combinations of these scanning and payment scenarios. We present a deeper analysis of three representative examples of these transaction process scenarios that pose different risks. The scenarios can each be combined with one of five possible methods of validation of the transaction. These representative scenarios are:

(1) a store employee who scans a customer's basket with a mobile device on the sales floor and processes a credit card payment using a mobile device, (2) a customer who scans products during shopping on the sales floor using a store mobile device, and then processes a payment at a regular self-checkout lane, and (3) a customer who scans products shopping on the sales floor using their mobile phone, and then makes a payment using a mobile phone using a mobile wallet or a mobile credit card.

We conducted several customer and shoplifter focus groups and surveys based on the several plausible scenarios and present the results that represent risk from a customer perspective. In addition, we visited several retailers who are piloting or have implemented mobile POS solutions, and engaged in action research by walking through the process and critically evaluating the inherent risks. We also conducted focus groups with loss prevention experts from retail firms, interviews with technology experts and consultants. Based on these various inputs, we formulated a risk framework.

Our risk framework is broad, as the strategic drivers of innovation as well as the operational challenges associated with implementing innovation cannot be compartmentalized in departmental silos. Such a major initiative at a retailer is usually managed by multidisciplinary teams, each with their own responsibilities and occasionally conflicting goals yet with a common underlying objective. There are tradeoffs to be made such as finding the right balance for the level of shrink with customer convenience. In some cases, there are hard choices to be made to introduce measures that will mitigate malicious shrink, but at the risk of negatively impacting customer experience. In these cases, a comprehensive and nuanced understanding of the issues surrounding the measures and their possible effect on customers can help to design processes that may achieve the objective of reducing shrink without negatively impacting the customer experience. Innovation decisions and operational implementation cannot be compartmentalized within functional areas as the decisions made by one team will affect other teams. The findings from our research point to the need for loss prevention teams to work closely with purchasing, supply chain, store operations, human resources, merchandizing, and other teams to design integrated systems and store processes to achieve strategic outcomes.

We identified shrinkage as a major risk for a firm implementing mobile POS. Shrinkage is a term that has different definitions, and we use the

term as used in a broad sense¹: “intended sales income that was not and cannot be realized.” Lost sales are the bane of retailers in this competitive retail environment, and while it is difficult to estimate for a variety of reasons, one estimate quantifies retail shrinkage worldwide in 2011 at \$119 billion or 1.45% of sales. For some retailers, this percentage is likely to be higher. The negative effect of shrink on the bottom line may be mitigated by increasing sales (e.g., by enhancing the customer experience with innovative technology, or by increasing customer convenience by making the shopping and checkout process quicker and easier). Shrink may also be mitigated by decreasing loss (e.g., by reducing the unrecorded removal of items from the store due to operational failure, repurposing labor to improve on-shelf product availability, by redesigning shopping and loss prevention processes to counter new malicious shrink risks that may arise with mobile POS). In some cases, it may be necessary to live with some loss if it will simultaneously help with top line growth. In others, it may be more efficient to reduce the bleeding and to moderate the loss of inventory.

Beck and Peacock posit a typology of shrink that includes four “buckets”. We believe that mobile POS which primarily impacts store processes and transactions on the sales floor has the potential to impact two of these buckets: malicious shrink by customers and operational shrink due to process and technology failures. There are three major reasons for why we expect these two buckets to be affected by a shift to mobile POS – even if mobile channels supplement rather than replace existing in-store checkout channels: (1) many emerging mobile checkout scenarios feature increased customer autonomy – and the lack of employee monitoring of these transactions can result in an increase in both malicious and operational shrink, (2) EAS devices need to be deactivated before customers leave the store and with increased autonomy, there may not be a touchpoint with an employee to facilitate this removal, and (3) because mobile transactions do not occur at a predictable fixed location in the store, it is harder to monitor these transactions using existing surveillance methods such as CCTV.

We had no reason to believe that mobile POS would impact inter-company fraud and we were not able to find or gather any evidence that there would be an impact on internal theft. Expressed as a percentage of total shrink however, in 2011, malicious customer shrink (43.2%) and operational shrink (16.2%) accounted for 59.4% of loss, and therefore mobile POS has the potential to have a considerable adverse

¹ See Beck, A. and Peacock C. (2009) *New Loss Prevention: Redefining Shrinkage Management*. New York: Palgrave Macmillan.

effect on firm profitability if associated risks are not well understood and carefully managed.

Examining the various risks, we report on the following major findings which will be explained in greater detail in this report:

Innovation is Occurring Quickly, but Will Take Some Time to be Completed. Of the many possible emergent mobile POS scenarios, not all will see widespread adoption – due to some of the risks that are detailed in this report and because of the better fit with different technologies based on retailer type.

“One Size Does Not Fit All”: There may be a need for segmentation by age, gender, and income among customers who opt to use mobile channels due to drivers of behavior including the utilitarian benefits from mobile shopping, shopping experience, and inhibitors including privacy concerns. Else the benefits from the innovation will not be realized because customers do not adopt the technology.

Tolerance for Validation: Exit inspections and other quality audits need to be carefully designed and where possible integrated into other shopping processes in order to avoid eroding customer satisfaction.

Operational Shrink: It is likely that initially there will be difficulties for both customers and employees due to technological issues and process issues that will result in increased shrink.

Malicious Shrink: We find no direct evidence from habitual shoplifters that malicious theft will be impacted. There is however concern that customers will take opportunistic advantage of increased customer autonomy in checkout processes and become offenders, and also that habitual shoplifters will use mobile checkout processes to create distraction.

Mobile Point-of-Sale and Loss Prevention: An Assessment of Risk Introduction



MOBILE TECHNOLOGY IN THE RETAIL STORE: WHY AND WHY NOT?

Retailers are evaluating a new wave of mobile technologies for possible integration into their sales operations. Benefits include labor cost savings, customer convenience, and customer engagement. There are also risks involved including malicious theft, operational inefficiencies, possible erosion of customer loyalty for various reasons, technology failure, and employees unprepared for the innovation.

Before assessing risk due to a technological innovation, it was necessary to understand that technological innovation. Therefore, our first task was to define our research scope and to then assess based on currently available information, what parameters and capabilities define that innovation in the immediately foreseeable future. Despite the inherent risk in introducing an innovation, such as a mobile technology, into a retail store, there is a compelling case for such an initiative. It can be argued that the current generation of retail customers in comparison to previous generations is increasingly technologically proficient, self-sufficient, seeks greater convenience, and, at the same time, expects an enhanced shopping experience. Mobile technology enables retailers to respond to these evolving traits and potentially to take advantage of them to increase sales and decrease costs. In a competitive retail landscape, it behooves retailers to innovate in order to maintain and to grow their market shares.

With the proliferation of smartphones, customers accustomed to searching for products and to do comparison shopping online are starting to do the same in the store. Further, customers accustomed to researching product quality and gathering their own information via consumer reports as well as social media websites, when they have

"I HAVE USED MOBILE SHOPPING, BUT NOT USING MY SMARTPHONE. I USED THE STORE'S MOBILE SCANNER. I FOUND THE PROCESS SAVED TIME AND ALLOWED ME TO BAG MY GROCERIES THE WAY I PREFER THEM BAGGED."

Customer (female, 30-39)

"CONVENIENCE AND EFFICIENCY ARE ALL WELL AND GOOD FOR BOTH CUSTOMER AND BUSINESS BUT I AM CONCERNED ABOUT THE LOSS OF INTERACTION AND DISCOURSE, EVEN IN THE SEEMINGLY MUNDANE ACT OF CHECKING OUT A PURCHASE WITH A CASHIER."

Customer (male, 40-49)

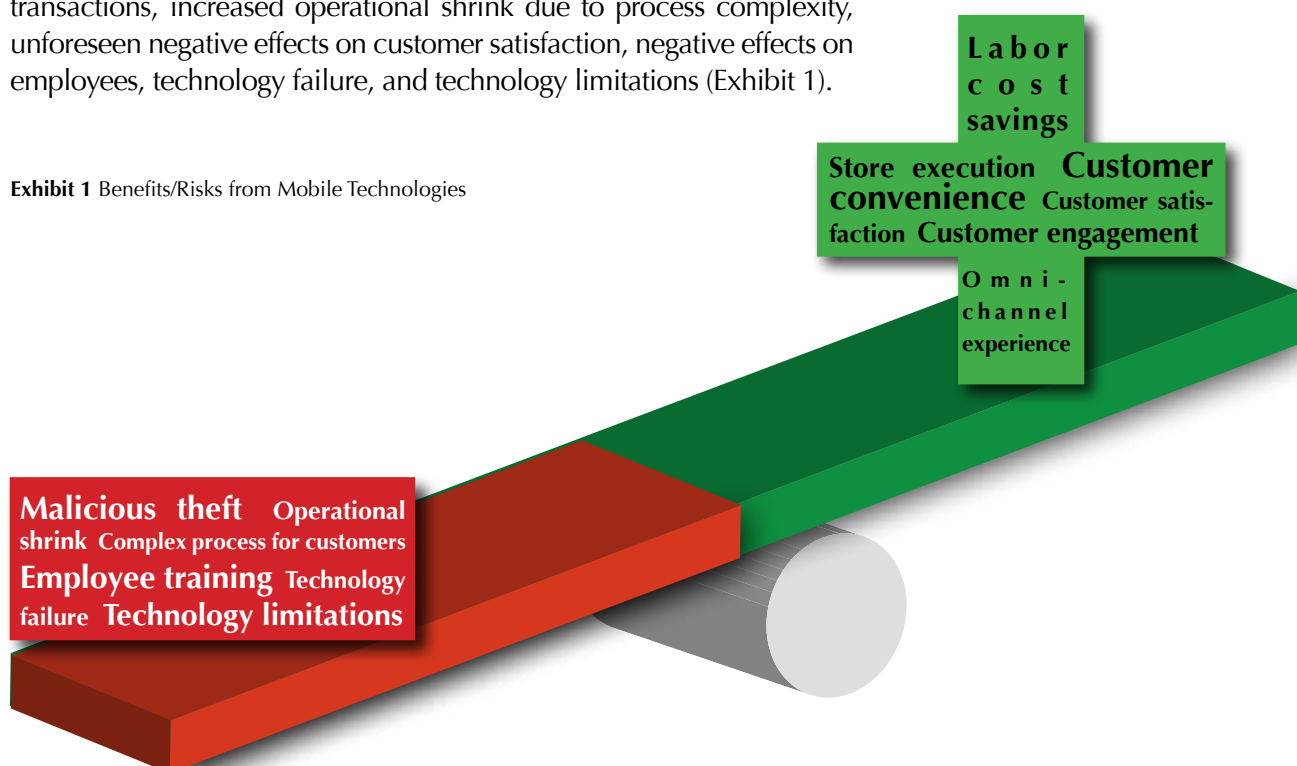
the ability to do so, naturally seek to do the same in-store. Customers accustomed to the transactional efficiency of an online purchase from the comfort of their home may not be as patient when waiting for a store employee to checkout a line of customers in the store. Customers accustomed to the media-rich and content-laden marketing used by e-commerce sites and television may react well to similar marketing via mobile channels. Thus, there is a case made that mobile POS will make in-store shopping more attractive for the customer by enhancing both convenience and shopping experience (Exhibit 1).

Customers scanning their own purchases also frees up the time of store employees who currently process sales transactions. This could reasonably be expected to result in either labor cost savings or improved store execution because the store employees can be repurposed to stock shelves, respond to customer requests, or to perform other duties that may improve store operations. Given these many possibilities, it is unsurprising that many retailers are pursuing mobility initiatives.

Anticipating possible negative outcomes and externalities helps with choices between alternative technologies, better design of operational processes, better design of training programs for employees, and preventative or ameliorative measures that may help counter harmful consequences. These possible negative outcomes are numerous, complex, difficult to foresee, and difficult to quantify. Examples of risks are increased malicious theft due to decreased ability to monitor transactions, increased operational shrink due to process complexity, unforeseen negative effects on customer satisfaction, negative effects on employees, technology failure, and technology limitations (Exhibit 1).

Mobile Point-of-Sale and Loss Prevention: An Assessment of Risk Mobile Technology in the Retail Store: Why and Why Not?

Exhibit 1 Benefits/Risks from Mobile Technologies



Point-Of-Sale and Checkout

Broadly speaking, with respect to physical location, a checkout process may be either confined to a predetermined fixed location in the store or it might be mobile (i.e., it is not necessarily confined to a predetermined fixed location in the store). There are three ways in which retailers may introduce or exploit mobile technology in the store for checkout: (i) the mobile technology may be in the hands and under the control of the customer, (ii) the mobile technology may be in the hands and under the control of a store employee, or (iii) the technology may be an artifact placed in the store environment (in effect, the transaction is automated because neither the customer nor the employee control the technology). There are many variants within these broad categories (e.g., a customer may use their own smartphone or they may use a store device) and some retailers may give their customers multiple ways in which they could checkout with mobile devices (not to speak of existing channels including employee-assisted checkout at cash registers and self-checkout lanes). Most large retailers do not foresee that mobile POS will replace traditional POS systems, but that mobile POS will be an additional shopping channel in the store.

Because there does not appear to be a dominant configuration that may emerge as the choice of most retailers and because different configurations are likely to be a good fit for different retailers, we believe that there are many mobile checkout scenarios that will be operational in the short- to medium-term. Each of the many configurations of checkout possibilities has its own idiosyncratic risk factors and, therefore, we attempt to enumerate these checkout processes by characteristics (whether they are fixed or mobile, and whether they are assisted checkout, self-checkout or automated).

Risk Framework

There are many agents and environmental factors involved in the retail industry that will influence innovation and will also be affected by innovation. In order to have an organizing structure, we organize the risk framework by examining the risks through several perspectives: technology, employee, retailer/store, product, and customer. This framework is shown in Exhibit 2.

Mobile Point-of-Sale
and Loss Prevention:
An Assessment of Risk
Mobile
Technology in
the Retail Store:
Why and Why Not?

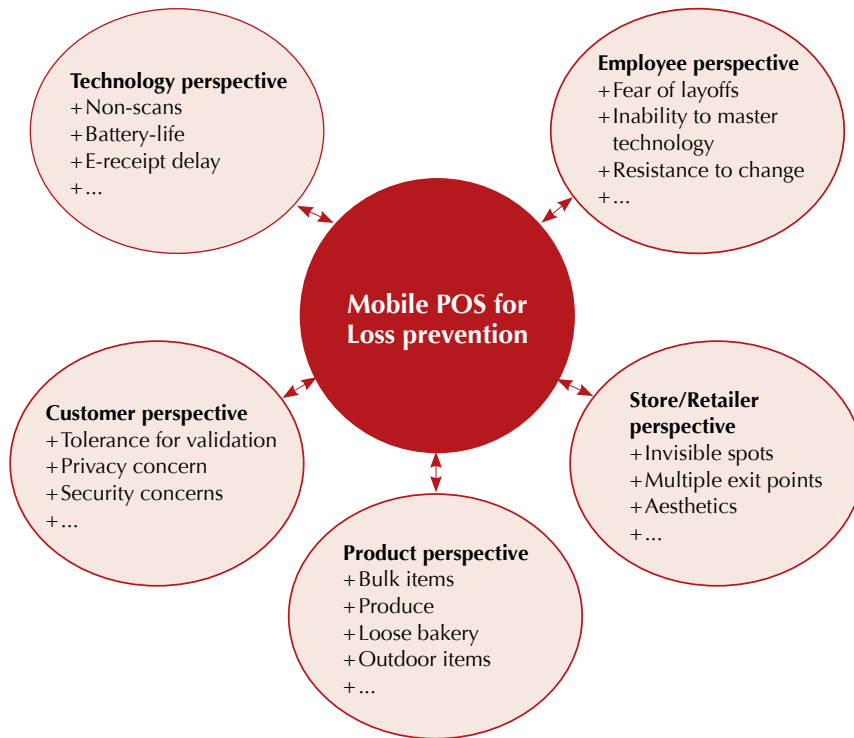


Exhibit 2 Risk Framework

We present detailed research findings where available, and also list and explore other issues related to each of these perspectives that will help to guide retailers implementing or improving their mobile POS initiatives. It is important to note that the effect of these agents and environmental factors will interact and due to the complexity of these multiple influences as well as each unique context, individual retailers should conduct a detailed evaluation tailored to their own specific situation.

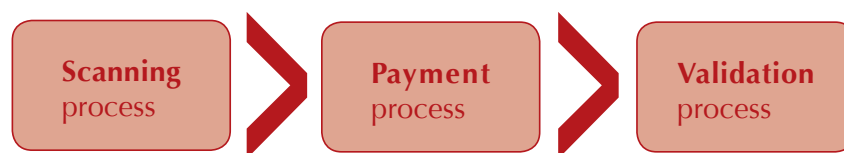
Mobile Point-of-Sale and Loss Prevention: An Assessment of Risk

Mobile Technology in the Retail Store: Why and Why Not?

CHECKOUT PROCESS IN A MOBILE POS WORLD

The checkout process in a mobile POS world consists of three phases, namely scanning, payment and validation. This provides retailers with various opportunities to integrate mobile technologies if they see a technology-process fit.

In order to conduct a risk assessment of mobile POS, it is necessary to first understand how mobile POS changes the checkout process in the store. We begin with an analysis of a POS checkout process at the most elemental level so as to be able to understand what parts of existing checkout processes may need to be re-engineered to accommodate mobile checkout. When we examine a customer who goes through a traditional employee assisted transaction in the store, although there can be many variations and added components end-to-end in the process, there are three components as shown in Exhibit 3.



Surveillance and Detection

Scanning process

- Mobile assisted
- Automated
- Mobile self-service (scanner app – smartphone)
- Mobile self-service (scanner device)
- Fixed assisted
- Fixed self-service

Payment process

- Mobile self-service (phone/store device)
- Fixed self-service
- Mobile assisted
- Fixed automated
- Fixed assisted
- Mobile self-service (phone)

Exhibit 3 Checkout Process

“I WOULD LOVE HAVING THE OPTION OF PAYING WITH MY SMARTPHONE. IN MY IDEAL WORLD, ALL OF THESE PROCESSES WOULD BE DIGITAL: PAYMENT, RECEIPTS, ETC. “

Customer (female, 20-29)

“I WOULD LOVE USING MOBILE CHECKOUT. IT WOULD MAKE MY LIFE EASIER TENFOLD.”

Customer (male, 30-39)

Mobile Point-of-Sale and Loss Prevention: An Assessment of Risk Checkout Process in a Mobile POS World

1. Scanning Process There is a data capture that identifies the items that the customer wants to purchase. This is usually accomplished electronically by means of an optical scan (e.g., a barcode scan) of an identification label (e.g., a barcode) on the package of the product.

There are however product types/retailers that are exceptions to this typical scenario. Some products, such as bulk grocery, need to be weighed, some products, such as loose bakery, do not have barcodes, but there needs to be an item count, some apparel and other items at some retailers (e.g., some department stores and specialty apparel stores) are RFID tagged.

2. Payment Process There is transfer of tender from the customer to the retailer for the value of the products that were scanned. This is usually accomplished by means of cash or electronic funds transfer, such as debit/credit cards, store cards and third party payment systems.

As with scanning, there are exceptions. Part or all of the payment may be through store or manufacturer coupons.

3. Validation Process The retailer needs to be reasonably assured that the customer has scanned and paid for all the items that they have with them when they leave. This process can take different forms and different retailer types use some of these components.

- > Cashiers at checkout counters visually inspect baskets, shopping carts, and the person of the customer when they scan and accept payment for products. They are able to help customers deal with operational errors that might result in shrink as well as act as a deterrent to malicious acts of theft.
- > Some retailers conduct exit inspections that match store receipts to the items in a shopping cart (e.g., some electronics specialty stores, some membership clubs).
- > Some high-value/high-shrink products have electronic article surveillance devices (e.g., hard tags, soft tags, spider wrap) on the items and these are removed or deactivated by a store employee.
- > Other forms of surveillance, such as video cameras, alert store employees walking the aisles and stationed at the exits, detect anomalous behavior that may indicate malicious acts of theft.

Fixed and Mobile POS

With traditional fixed location POS, scanning, payment and validation processes mostly happen at the same time and the same place—at predetermined points, usually near the store exit (except



for department stores and some other retailers). With mobile POS, the scanning process, the payment process, and the validation process may happen at different places that are not predetermined and at different times. For example, a customer may scan items using a mobile phone when browsing for products in the store. They may then use their phone to make an electronic payment at an NFC terminal. Alternatively, they may walk up to a store employee who has a mobile device capable of processing an electronic payment. This can cause challenges for loss prevention as existing processes that relied on this synchronicity as well as the predictability of location will have to be fundamentally changed to adapt to the new scenarios. One example is a video camera that monitors a self-service checkout lane and which can synchronize a POS transaction record with a customer's scanning motion before the item is bagged. If the two do not synchronize, then an exception is recorded. However, with mobile POS, it is not possible to place a video camera so that it can record every scanning motion. Therefore, in this scenario, a new solution has to be found—a different form of validation in the checkout process.

Some mobile scenarios involve a greater degree of autonomy for the customer. Because some forms of the validation process as well as surveillance and detection methods feature store employee involvement, this is an important factor in evaluating risk in the shift to mobile. We therefore also examine differences between checkout scenarios based on whether the transaction processes are employee assisted, self-service, or automated.

We thus have six scanning scenarios (shown in Exhibit 4) and six payment scenarios (shown in Exhibit 5) based on these characteristics that have implications for loss prevention. Some (like fixed assisted scanning) are for comparison purposes, as this is still the most common scenario in use. Others (like mobile self-service scanning) are the emerging scenarios that are the subject of this research and therefore of primary interest. Still others (like fixed automated scanning) are scenarios that have been tested and with technological advances and cost decreases could emerge in the medium-term. The list below includes descriptions of these scenarios that help explain how they are or may be operational in stores:

- 1. Fixed Assisted Scanning** A store employee scans products at a fixed point of sale.
- 2. Fixed Self-service Scanning** A customer uses a fixed self-scan terminal.

3. Fixed Automated Scanning Products on a belt are automatically scanned by a 360 scanner.

4. Mobile Assisted Scanning A store employee uses a mobile device to scan items for customers on the sales floor.

5. Mobile Self-service Scanning A customer uses either a store mobile device or their own mobile phone to scan items as they shop on the sales floor.

6. Mobile Automated Scanning Smartcarts equipped with EPC-readers or 360 scanners automatically record items as customers put tagged products in the cart.

Some of these encompass several possible actualizations – for example, fixed self-service payments could mean a customer making a secure transaction using a mobile phone and an NFC payment terminal. It could also mean a customer using their mobile phone for a secure transaction through an online payment portal.

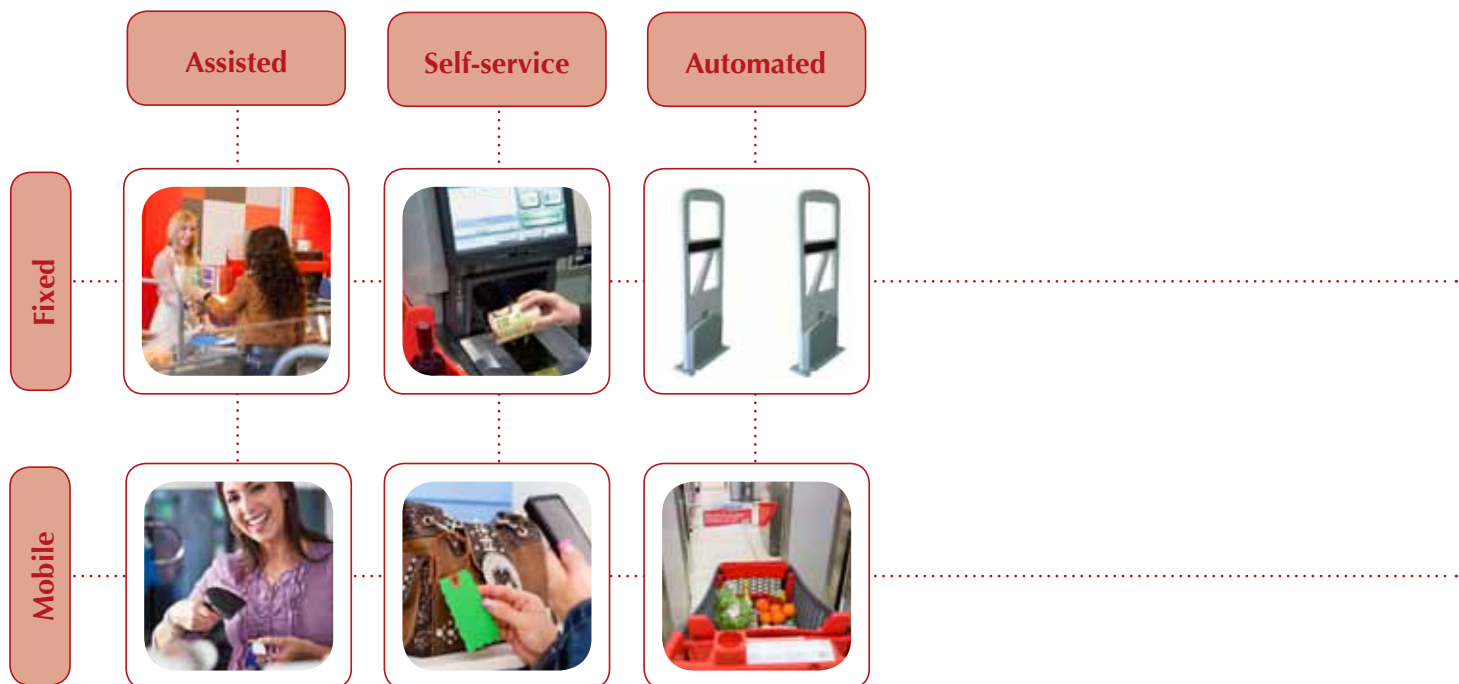


Exhibit 4 Scanning Process

Similarly, there are six payment scenarios:

1. Fixed Assisted Payment: A store employee accepts cash or credit/debit cards at a fixed POS.

Mobile Point-of-Sale and Loss Prevention: An Assessment of Risk Checkout Process in a Mobile POS World

2. Fixed Self-service Payment: A customer uses a fixed self-service register to pay using cash or credit/debit cards.

3. Fixed Automated Payment: Payment is charged to a customer store account or credit card enabled by a link to customer ID and to product scanning software.

4. Mobile Assisted Payment: A store employee uses a mobile device to process credit/debit card payments for customers on the sales floor.

5. Mobile Self-service Payment: A customer uses their mobile phone for virtual credit card or mobile wallet payments using wifi/3G or NFC terminals.

6. Mobile Automated Payment: Smartcarts equipped with EPC-readers or 360 scanners automatically charge a customer store account or credit card account.

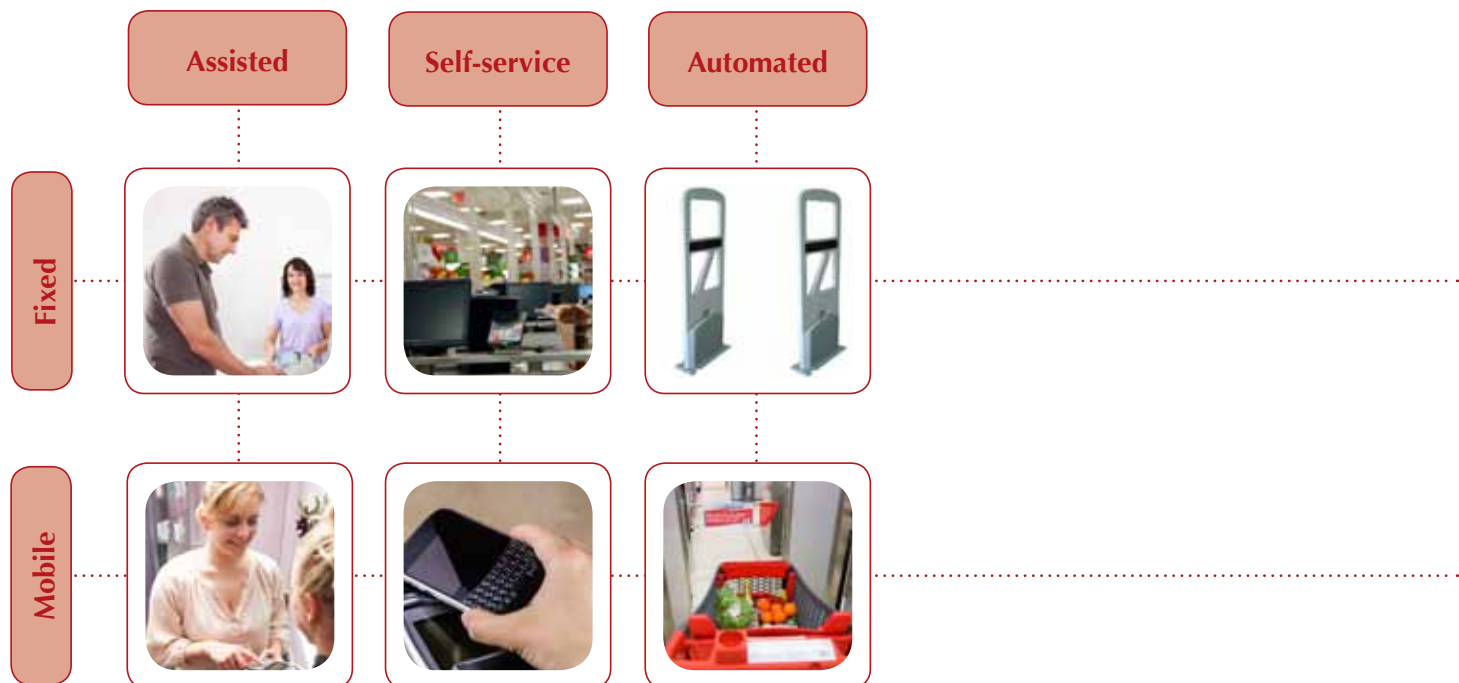


Exhibit 5 Payment Process

Additional Elements of the Checkout Process

1. Bagging

This creates a complication in a mobile scenario because of the need to provide access to bags that are usually placed near fixed checkout terminals. There are multiple possible solutions:

- > Provide bag stations distributed around the sales floor. Either customers or store employees bag products after scanning and payment.
- > Provide reusable bags for sale at the entrance. Customers either bring their own bags or purchase them when entering.
- > Provide bag stations at the exit. When customers use baskets or carts, they can bag when leaving the store.
- > Provide bag containers on shopping carts. Customers can scan and bag as they walk the sales floor.

2. EAS Device Removal

Because allowing a customer to remove an EAS device defeats the purpose of the device, this is also a complication, but there are possible solutions:

- > Provide employees with mobile EAS removal devices.
- > Provide secure EAS device removal stations on the sales floor that only employees can use.
- > Flag items with EAS devices in the scanning system so that customers who self-scan are asked to go to an employee-staffed station to remove the EAS devices.
- > Synchronize EAS soft tags with scanning so that a customer with an ID deactivates the device when scanning.

3. Age Verification, Identity Verification, and Prescription

Because age or identity verification and prescription purchases usually require employee involvement in the transaction, the increased customer autonomy associated with mobile scenarios requires some process change:

- > Flag items that need age or identity verification in the scanning system so that customers who self-scan are asked to go to an employee-staffed station for verification.
- > Depending on legality, pre-approve registered customers to self-scan using their mobile phones or checkout store devices.

- > Depending on legality, provide age verification (driver license) self-scanners at self-service scanning terminals.

4. Increased Importance of Validation

With fixed location checkout processes, validation is at least partly integrated into the scanning and payment transactional processes. This is easy for three reasons:

- > Employees involved in the transaction can be used to check baskets against payments without necessarily having a separate process. In this case, validation is integrated into scanning and payment. In comparison, if customers can checkout using their mobile phones without employee assistance, a validation check necessitates a separate exit inspection.
- > Automated EAS devices can be removed by store employees as they complete the transaction. In comparison, if a customer is allowed to remove EAS devices, an alternative validation method is required.
- > Self-scan lines are easy to monitor using video and store employees because customers are funneled into this pre-determined location. In comparison, if the customer self-scans on the sales floor, again, an alternative validation method is required.

Possible Alternative Approaches to Validation

Below we list and discuss a few key possible alternative approaches to validation, with the advantages and disadvantages of each:

1. Corraling

Physically segmenting customers by mode of checkout (separate lanes for assisted checkout, mobile scan, and self-checkout channels).

Advantages

- > Speed and convenience for customer.
- > Potential labor savings for retailer.
- > Ability to implement channel-specific validation or detection methods (e.g., audit based on data capture for mobile self-checkout).

Disadvantages

- > Potentially detracts from store aesthetics and the customer experience.
- > The multiple channels and the corrals use up more floor space.

Likely suited to

- > High traffic, large footprint, diverse assortment general merchandise stores.

2. Data Capture and Analytics-based Audit

First time mobile self-checkout users, those who have been previously flagged for mistakes, and others who are flagged as threats are selected for audit.

Advantages

- > Minimizes inconvenience for regular users and for honest customers.
- > More feasible for retailer than 100% check.
- > Customers may be trained to use the process in their first experience and thus true errors may be decreased.

Disadvantages

- > May inhibit customer adoption due to the inconvenience in their first experience.
- > Organized criminals and habitual shoplifters are likely to learn which customers will not be audited and exploit this knowledge.
- > Need to track customers (potential to create fake new identities).

Likely suited to

- > Mobile self-checkout stores that require customer registry for use.

3. 100% Audit

All customers are checked when exiting the store.

Advantages

- > Effective as a deterrent because malicious shoplifters know that they will be audited.
- > Potential to prevent the occurrence of “errors”.

Disadvantages

- > Customers have very low tolerance for the practice.
- > Implementation not feasible except for small baskets and so it may be easy to add extra unpaid items to the basket.

Likely suited to

- > Membership stores.
- > Stores with high value, high shrink products.
- > Stores with small basket sizes.

4. Employee Engagement and Monitoring

Employees engage with the customer on the floor and monitor customers for transaction errors and malicious acts.

Advantages

- > Customer engagement may result in upselling and cross-selling opportunities, as well as enhancing the customer experience and process satisfaction.
- > Intolerance for validation is minimized as validation is disguised in the interaction.

Disadvantages

- > High labor costs for high traffic stores.
- > Malicious shoplifters may be able to avoid these interactions.

Likely suited to

- > Department stores, home improvement, fashion apparel, electronics, and other high engagement stores.

5. Employee Assistance on Transaction Completion

Interaction with an employee immediately preceding or following payment (which may or may not be assisted), including EAS deactivation, bagging and product warranty.

Advantages

- > Customer engagement may result in upselling and cross-selling opportunities, as well as enhancing the customer experience and process satisfaction.
- > Intolerance for validation is minimized as validation is disguised in the interaction.
- > Increased labor costs.

Disadvantages

- > The requirement for employee interaction reduces the convenience benefits from the mobile transaction.

Likely suited to

- > Department stores, home improvement, fashion apparel, electronics, and other high customer engagement stores.

THREE REPRESENTATIVE EMERGING MOBILE POS SCENARIOS

Three representative emerging mobile POS scenarios are discussed in depth. In each of these scenarios, we describe how mobile technologies could be used to assist customers during the shopping process, and discuss potential benefits and disadvantages.

Mobile Assisted Scanning and Mobile Assisted Payment

A store employee equipped with a mobile device on the sales floor processes a customer transaction. The store employee scans the products in the customer's basket and uses a credit card terminal attachment to accept payment (as shown in Exhibit 6).

Advantages

Provides the customer with the convenience of being able to incorporate their browsing with their transaction without having to seek a cash register. Gives store employees the opportunity to engage with the customer and to cross-sell/up-sell. The key benefit here is that the interaction with the customer may occur before the customer has made their final purchase decision, thus allowing the store employee to influence that decision. Assuming that store employees will have the means to remove EAS devices, customers may be able to exit the store without having to find fixed terminals or stations and potentially have to wait in line for service.

Disadvantages

Especially in busy periods, it can cause customers some frustration if they are not able to locate a store employee to help them, though



Exhibit 6 Employee with Mobile Device Scenario

they could always find a fixed cash register. Bagging is a problem for a high service retailer as store employees may have to go to the nearest bagging station on the sales floor. If the employees' mobile device cannot print a receipt, the customer will have to have a mobile phone in order to receive and display their e-receipt as proof of purchase. If the device is an iPad, iPod, iPhone or Android, it is typically not retail rugged and is an asset that needs to be secured.

Implications for Loss Prevention

Because this scenario involves employee involvement, it is probably not very different from existing department store configurations that have fixed registers at locations on the sales floor. There is one feature that may act as a deterrent to malicious acts, such as paying for only some items and leaving with others for which payment has not been made. Because payment is by credit card, the retailer has identified the customer and our focus groups indicated that all types of shoplifters are reluctant to offend on a visit in which they have provided some form of identification. Offenders may however walk out without making a payment of any kind, using a bag from a bagging station as a cover. If it does not interfere with the shopping experience, a random exit inspection could be incorporated into the process as a deterrent, though e-receipts may be a complication requiring a store employee to view a customer's personal phone.

Mobile Self-service Scanning with Store Device and Fixed Self-service Payment

A customer registered with the store uses a store mobile device to scan products as they shop on the sales floor. The mobile device records the scanned products and creates an electronic ID for the basket that can be transferred to the store system. As they exit the store, the customer uses a self-service lane to make a payment based on the electronic basket ID (as shown in Exhibit 7).

Advantages

Provides the customer with the convenience of being able to incorporate their browsing with their transaction without having to seek a cash register. Store mobile devices are retail rugged and have a long expected usable life. They may be more reliable for scanning than a customer device.

Mobile Point-of-Sale and Loss Prevention: An Assessment of Risk Three Representative Emerging Mobile POS Scenarios



Exhibit 7 Customer with Store Mobile Device

Disadvantages

Difficulty scanning due to technology problems or due to customers lacking in scanning proficiency can be a challenge, though they could always find a fixed cash register if this is the case. Bulk grocery and loose items, such as bakery, require separate processes causing inconvenience for customers. Age verified products and EAS tagged products require employee intervention. Typically, these devices are expensive for the retailer, tend to be more bulky than a smartphone for the customer to use require a sizable investment, and they are also additional assets that need to be protected.

Implications for Loss Prevention

Because this scenario does not involve employee involvement and the scanning cannot be easily monitored given that it is not at a fixed location, this scenario is potentially problematic for loss prevention. If it does not interfere with the shopping experience, an exit inspection could be incorporated into the process. This scenario is a candidate for corralling, as the scanning devices need to be returned and therefore this creates a natural funnel for customers exiting the store, thus enabling channel specific validation.

Mobile Self-service Scanning with Smartphone and Mobile Self-service Payment

A customer registered with the store uses a smartphone to scan products as they shop on the sales floor. The mobile device records the scanned products and creates an electronic ID for the basket that can be transferred to the store system. Before they exit the store, the customer uses the smartphone to make a payment via a mobile wallet or virtual credit card terminal based on the electronic basket ID (as shown in Exhibit 8).

Advantages

Provides the customer with the convenience of being able to incorporate their browsing with their transaction without having to seek a cash register. The retailer can engage with the customer through their mobile device by providing product information, product reviews, social media content, and product recommendations. The key benefit here is that product recommendations can be targeted to the customer based on the preference information revealed by the products the customer has scanned. Assuming that none

Mobile Point-of-Sale and Loss Prevention: An Assessment of Risk Three Representative Emerging Mobile POS Scenarios



Exhibit 8 Customer with Cell Phone

of the products in their basket require EAS device removal or age verification, customers may be able to exit the store without having to find fixed terminals or stations and potentially not have to wait in line for service. The physical device does not cost the retailer anything and customers have the convenience of using a familiar device.

Disadvantages

Difficulty scanning due to technology problems or due to customers lacking in scanning proficiency can be a challenge, though they could always find a fixed cash register if this is the case. Bulk grocery and loose items, such as bakery, require separate processes causing inconvenience for customers. Age verified products and EAS tagged products require employee intervention. The customer has an e-receipt on their personal device, which poses some challenges at exit inspections.

Implications for Loss Prevention

Because this scenario does not involve employee involvement and scanning cannot be easily monitored given that it is not at a fixed location, this scenario is potentially problematic for loss prevention. If it does not interfere with the shopping experience, an exit inspection could be incorporated into the process. This scenario could be a candidate for corralling, so that all customers who use this channel are asked to exit through a specific lane, thus enabling channel specific validation. Falsified e-receipts with the date changed from a previous visit are a possibility.

Mobile Point-of-Sale and Loss Prevention: An Assessment of Risk Three Representative Emerging Mobile POS Scenarios

RISKS TECHNOLOGY PERSPECTIVE

Retailers need to be aware of the technological risks associated with mobile technologies in a mobile POS world.

Based on interviews with technology experts and based on action research at stores, we identified the following risks from a technology perspective:

- > Non-scans
- > Battery-life
- > EAS device removal and deactivation
- > Wireless failure
- > E-receipt delay on mobile device
- > Other system failures

Non-scans

A customer might use a scanning motion with their mobile phone or with a store mobile scanner. However, it is possible that the item may not scan, and with some devices and systems in use, the customer may not realize that it was an improper scan. The result is that when the item is removed from the store, this is a cause for operational shrink as the retailer would not receive payment and the item would still be in inventory.

To safeguard against this situation, a display on the mobile phone that lists the items scanned might help. Because this requires the customer to monitor the list, it is likely to be more effective to build in feedback in the form of a distinctive sound (say “woosh!”) that lets the customer know that the scan was successful. Our customer focus groups indicated that a primary concern was the fear of making an inadvertent mistake and being accused of theft, and the audio feedback would serve to alleviate that concern.

“I THINK SHOPLIFTING WOULDN’T NECESSARILY BECOME EASIER -- JUST NEW METHODS WOULD BE CREATED. FOR EXAMPLE, IF THERE WERE EMPLOYEES WALKING AROUND THAT COULD CHECK OUT A CUSTOMER, A FRIEND OF SAID EMPLOYEE COULD PRETEND TO HAVE BOUGHT AN ITEM, OR A CUSTOMER CAN PRETEND THEY WERE RUNG UP AND HAD A RECEIPT (THAT HADN’T REACHED THEIR E-MAIL YET) SENT TO THEM.”

Customer (male, 20-29)

“EMAIL RECEIPTS WOULD BE A BIG INCENTIVE FOR ME TO USE MOBILE SHOPPING.”

Customer (female, 20-29)

Battery-life

A customer using a mobile phone to scan items would be considerably inconvenienced if their phone battery died during the shopping trip, as they would have to locate an alternative channel and scan all items again, perhaps having to wait in line. When in scanning mode, mobile phones use up power comparatively quickly and so this is a concern for retailers as it could erode customer satisfaction on the visit.

One remedy that enables an informed decision by customers is to provide them with a warning about their battery life when they access the scanning application. They can then decide whether or not to use the mobile shopping channel based on the expected length of their shopping trip. Another possible solution is to have a charging station—although it is unrealistic to expect charging stations to be meaningful to the customer who has a long shopping list, it could be helpful to the customer who has a fairly short shopping list and is shopping during a busy time, such that they just need a shot-in-the-arm charge to a dead or near-dead battery so the customer can complete the quick shopping trip.

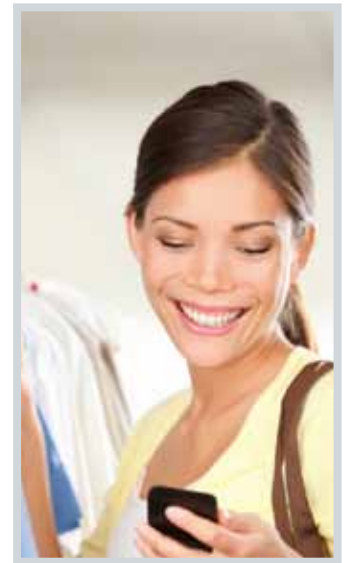
EAS Device Removal and Deactivation

One aspect of using mobile technology is that the customer often has increased autonomy in completing their transaction. Removing an EAS device involves store employee intervention so that a customer cannot circumvent the device.

Designing a removal/deactivation process that does not require customers to locate a store employee poses a problem, but technology may be able to provide the solution. One solution is to link scanning and/or payment with deactivation and/or removal. Thus, if deactivation automatically triggers scanning/payment, there is a built-in safeguard against unrecorded deactivation or removal of EAS devices.

Wireless Failure

Store employees or customers with mobile devices that rely on store wireless systems will not be able to use a mobile channel if the wireless fails. This could erode customer satisfaction on the shopping visit because of the unfulfilled expectation of being able to use the more convenient channel.



One remedy is a technology solution that provides backup 3G/4G systems that kick in when wireless fails. Thus, the customer experience will be seamless as they will be shielded from the wireless failure.

E-receipt Delay on Mobile Device

There could be delays or non-receipts in customers receiving e-receipts on their mobile phones so that when they exit the store they have no proof of purchase. The delay or non-receipt could be because of a malfunction in the store system or the customer's email server. The customer's email server may also delay delivery of a message because of security or other concerns. In these cases, the customer could be accused of attempted theft or at the very least experience a delay in leaving the store.

Although some of these occurrences might be unavoidable, at the very least, there should be a standard process and store employees and security personnel should receive adequate training on how to quickly verify the purchase using other means while being sensitive to customer satisfaction.

Other System Failures

In our action research at several different retailers, we experienced other system failures where the checkout system froze, the scanning device did not function, and there was a glitch in linking product scans to a store account. Such failures may be difficult to eliminate especially in the initial stages of implementation.

Store employees trained to handle exceptions will be vital to minimize harm from these failures. In one case, although an employee experienced difficulties with the system themselves and could not fix the problem, they immediately gave store credit when there was some doubt about whether a payment had gone through, so that the customer did not risk a duplicate payment. Quick response and a transparent explanation might serve to alleviate any frustration experienced by the customer.

RISKS EMPLOYEE PERSPECTIVE

Retailers need to consider the employee perspective as they evaluate mobile technologies to play a critical role in in-store business operations.

Based on our customer focus group responses and open-ended responses on surveys, as well as our observations and conversations with employees as we conducted our action research in retail stores, we identified the following potential risks from an employee perspective. Note that further research involving store employees would be needed to assess the level of risk for each of the listed risks:

- > Fear of layoffs
- > Inability to master technology and resistance to change
- > Impatience with customers
- > Opportunity for employee-aided loss
- > Apathy toward increased shrink

Fear of Layoffs

From a variety of sources, this emerged as the foremost concern of many people, including customers in focus groups and survey respondents (some who reported that they worked in the retail industry themselves). The fear was that the increased customer autonomy enabled by many mobile POS scenarios would result in stores reducing their in-store labor force. Some customers even stated that they would not use mobile POS because they did not want this to happen. The risk therefore is that adopting mobile POS may lower morale and/or trigger resistance to the innovation.

Reassuring employees that their jobs were not in danger, and instead repurposing them from checkout lanes to performing other

“AN ADDITIONAL DOWNSIDE TO MOBILE CHECKOUT IS A POSSIBLE DECLINE IN JOBS IN STORES USING IT.”

Customer (female, 20-29)

“IN GENERAL, TECHNOLOGICAL ‘ADVANCES’ THAT REPLACE HUMAN-TO-HUMAN INTERACTIONS WITH DRAMATICALLY INFERIOR HUMAN-TO-MACHINE INTERACTIONS IRRITATE ME. THE FACT THAT HUGE MASSES OF PEOPLE LOSE THEIR JOBS DUE TO IT (AND THAT MONEY SIMPLY GOES TO PAD THE BOTTOM LINES OF THE COMPANIES INVOLVED) IS NOT TERRIBLY ATTRACTIVE TO ME EITHER.”

Customer (female, 50-59)

operational (e.g., restocking shelves) and customer engagement activities could alleviate concerns. Publicizing this reassurance to customers may also serve to increase adoption by customers, as well as help with public opinion on the matter.

Inability to Master Technology and Resistance to Change

We found when visiting stores, adopting employee-assisted mobile POS channels that on more than one occasion, some employees were not able to use the devices and that they instead used more traditional channels. At least in one case, they seemed resistant to the idea of changing to the new checkout system because they thought that the old process was quicker and easier for them to complete a transaction.

Designing training programs that show employees how to use mobile POS systems and devices seems like a necessary step, especially as the new process is intended to increase customer convenience and to enhance the shopping experience.

Impatience with Customers

Our customer focus groups show that customers fear that using mobile self-checkout might be challenging for them to navigate without error and if store employees are not patient with customers as they learn how to use the new processes, this could kill adoption and have a negative impact on the shopping experience.

Employee protocols that stress the need to educate customers on how to use the new checkout processes, as well as help enhance the shopping experience as they use it for the first time could help adoption.

Opportunity for Employee-aided Loss

Our focus groups with shoplifters showed that they relied on knowing internal systems and processes to be able to circumvent these systems and processes. In some cases, this knowledge came from being former store employees. In other cases, they had friends and acquaintances who were retail employees.

Shoplifters indicated an initial reluctance to shoplift in the face of these new checkout processes because they did not fully understand the systems of checks and balances. However, if they had confederates in the store that could explain the new processes and parameters, this could spur shoplifting that could increase shrink. Further, given

Mobile Point-of-Sale and Loss Prevention: An Assessment of Risk **Risks** Employee Perspective

the increased customer autonomy of some forms of mobile POS, it does not appear to be a reason that malicious shrink will increase by direct actions of confederates at the scanning and payment stages of checkout. However, with the increased importance of validation, there could be opportunity for confederates to aid shoplifters at that stage.

Apathy toward Increased Shrink

It is possible that because some forms of mobile POS increase customer autonomy in the checkout process, store employees are no longer directly responsible for or have control over these transactions. It is possible that they may not feel responsibility for either operational or malicious shrink that may be the outcome of these transactions.

Retailers may need to investigate how they might motivate store employees who are not part of the asset protection team to monitor customers and transactions.

Mobile Point-of-Sale and Loss Prevention: An Assessment of Risk **Risks** Employee Perspective

RISKS RETAILER / STORE PERSPECTIVE

Retailers need to consider their physical store characteristics and the services they offer customers as they evaluate mobile technologies for integration into their in-store business operations.

Based on our customer focus group responses, action research in retail stores, and shoplifter focus groups, we identified the following potential risks from a product perspective:

- > Large footprint stores with invisible spots
- > Multiple exit points
- > Negative impact on aesthetics
- > Reduced opportunity to upsell and cross-sell
- > Erroneous customer accusation
- > Increased technology, equipment, and other costs
- > Bagging
- > Warranty
- > Staffing for assisted mobile checkout

Large Footprint Stores with Invisible Spots

Many existing surveillance devices, such as fixed location cameras, rely on being able to funnel customers through the point of transaction (e.g., cameras at self-checkout lanes that synchronize POS transactions with customer's motions). Because some mobile POS scenarios feature transactions that could occur anywhere on the sales floor, it becomes more difficult to monitor customers. Further, a perceived zone of surveillance in which a shoplifter feels as if they are being watched can be a deterrent. Large footprint stores

"I THINK THE METHOD OF CHECKOUT HAS LITTLE TO NO IMPACT ON THEFT. PEOPLE WHO STEAL DON'T STEAL BECAUSE OF THE METHOD OF CHECKOUT, BUT RATHER BECAUSE THEY WANT TO STEAL."

Customer (male, 20-29)

"AUTOMATICALLY SCANNING OF PHONE IS AWESOME. PROVIDED THAT SOME REWARD SYSTEM SHOULD BE KEPT TO ENCOURAGE CUSTOMERS TO USE THEIR PHONES FOR CHECKOUT."

Customer (male, 20-29)

with invisible spots become particularly vulnerable because of the difficulty of monitoring customers and also because customers may not perceive that they are being monitored.

Retailers could explore the possibility of dummy cameras placed around the store (in addition to the cost of real surveillance equipment) that could increase the perception of monitoring. Motion activated electronic devices placed near high shrink items that emit sounds or blink when a customer passes by could also create the perception of monitoring.

Multiple Exit Points

Validation becomes more difficult with higher labor costs in stores that have multiple exit points.

Corralling customers or separating them by their checkout channel at the point of checkout before they approach an exit may facilitate validation.

Negative Impact on Aesthetics

Corralling which separates customers by their checkout channel (e.g., assisted, self-service, mobile) can have a negative impact on store aesthetics.

It may be possible to funnel customers to separate checkout lanes without physical barriers, so that there is a more open feel to the checkout area.

Reduced Opportunity to Upsell and Cross-sell

The increased customer autonomy that is a feature of some forms of mobile POS can mean that store employees have less opportunity to engage with the customer and less opportunity to influence their final purchases.

It is possible however that if the customer uses a mobile phone in the store during shopping, the retailer has increased opportunity to engage with them through the mobile phone. Providing product information, product reviews, and product recommendations based on their scans may be as effective or more effective than human interaction for some retailers.

Erroneous Customer Accusation

A customer who does not scan an item in their cart due to a technical glitch with their mobile phone or app or who does not

receive their e-receipt before they exit can be accused of shoplifting. The possibility of an erroneous accusation is greater than in the past when employees scanned products or in the more controlled environment of a self-checkout lane.

Depending on their context, retailers will need to carefully design protocols for exit inspections and how employees handle exceptions when items in a basket do not match a receipt or when no receipt is available.

Increased Technology, Equipment, and Other Costs

Enterprise systems that can handle multiple checkout channels and forms of payment, mobile devices for employees, increased validation costs, and increased surveillance equipment costs can all make mobile POS expensive.

Some of these costs should be offset by reduced labor costs at checkout and by reduced expenditure on cash registers.

Bagging

Providing bags with all mobile checkout scenarios creates difficulties. High service retailers need to devise a process for store employees to access bags, whereas others will need to devise a process for customers to access bags.

High service retailers will need to have bagging stations on the sales floor so that an employee who completes a transaction can bag items for a customer with minimal delay. Others could either provide bags in shopping carts so that customers can bag as they go or near the exit when the customer leaves the store. Some customers may choose to bring reusable bags on each visit.

Warranty

Electronics and other stores that require warranty registration need to devise a system for customers who buy certain products to register them before leaving.

Electronic kiosks or a warranty station manned by an employee near the exit may be a solution.

Mobile Point-of-Sale and Loss Prevention: An Assessment of Risk **Risks** Retailer/Store Perspective

Staffing for Assisted Mobile Checkout

In the employee assisted mobile checkout scenario, staffing is a potential problem, as a customer who expects the convenience of mobile checkout will be disappointed if they had to seek a fixed location.

Staff optimization software might help with ensuring that there are sufficient store employees available based on store traffic patterns. Also, careful stationing of store employees on the sales floor in zones would help ensure that staff in the store are readily available.

Mobile Point-of-Sale
and Loss Prevention:
An Assessment of Risk
Risks Retailer/Store
Perspective

RISKS PRODUCT PERSPECTIVE

Retailers need to consider product characteristics and what implications that would have for the implementation of mobile technologies in their in-store business operations.

Based on our action research and expert interviews, we identified the following risks from a product perspective:

- > Bulk items, produce, and loose bakery
- > Age-restricted products, identity-required products, and prescriptions

Customer self-service mobile checkout involves a standard process in which the customer scans a barcode on an item before they leave the store. Any exception to this requires a separate process.

Bulk Items, Produce, and Loose Bakery

These items may not have barcodes and therefore require the customer to go to a weighing station or a station with a kiosk that can print a barcode that can be scanned. Similarly, with loose bakery, the item barcode can be posted on the shelf and the customer can scan the barcode and then input the number of units on their mobile phone.

Age-restricted Products, Identity-required Products, and Prescriptions

These require employee intervention so items that need age or identity verification are flagged in the scanning system so that customers who self-scan are asked to go to an employee-staffed station for verification.

“MOBILE SHOPPING IS A SILLY IDEA FOR LARGE GROCERY PURCHASES: EVERYTHING WOULD STILL HAVE TO BE REMOVED FROM THE CART TO BE BAGGED BEFORE LEAVING THE STORE. IF YOU THEN ADD AN INSPECTION TO IT, THEN WHY SHOULD THE CUSTOMER DO THE WORK OF SCANNING?”

Customer (female, 50-59)

RISKS CUSTOMER PERSPECTIVE

Retailers need to consider the customer perspective when evaluating mobile technology solutions for implementation in their in-store business operations.

Customer Focus Groups

The primary findings from the customer focus groups were:

- > **What does mobile checkout mean to you?** There was a wide range of views on what constituted mobile checkout, and some of the responses were not within the scope of a customer in a brick-and-mortar store making a purchase from that retailer. Most seemed to be aware of the primary scenarios that are implemented or under consideration by retailers.
- > **What are your prior experiences with mobile checkout?** There was a fair amount of literacy about technologies (smartphone scanning, QR codes, mobile wallets) and potential use cases for mobile shopping. However, with the exception of some who had used mobile coupons (which may be considered a form of payment), the focus group participants had not used mobile checkout in the store.
- > **What do you like or dislike about various mobile checkout scenarios?** (some emergent scenarios were explained) Two broad themes emerged: they were drawn to the convenience primarily of mobile scanning as long as details, such as bagging, could be streamlined and had concerns primarily about mobile payments. In general, most people seemed to indicate that they would be open to using mobile shopping channels despite some reservations.
- > **Why might you prefer to use one mobile checkout scenario over the other?** The reasons for preferences for one over the other can

“RIGHT NOW MOST STORES DO NOT HAVE ANY KIND OF EXIT INSPECTION. YOU CAN JUST WALK RIGHT OUT THE DOOR. THERE IS NO NEED TO GO THROUGH THE CHECKOUT LINES. EXIT INSPECTIONS ARE OBNOXIOUS.”

Customer (female, 20-29)

“I THINK FINANCIAL INTERACTIONS ARE UNSAFE ON A MOBILE PHONE IN GENERAL.”

Customer (female, 30-39)

be organized into two categories: situational (e.g., difficult to scan products, large basket) and personal preferences that may be related to personality type (introverts do not like talking to people).

- > **What can go wrong with mobile checkout?** In contrast to the stated willingness to use mobile checkout in the previous sections despite the concerns voiced, the potential problems and difficulties voiced here were enough to deter usage. In general, the thought of technological glitches or the thought of being the victim of fraud or theft due to the vulnerability of mobile transactions was sufficient to make people think twice.
- > **Do you think that the following (video surveillance, exit inspections, roaming store employees, loyalty cards, RFID-based EAS) will deter shoplifting in a mobile checkout scenario?** In general, these participants (who were not offenders) believed that surveillance and tracing would be a deterrent to malicious theft.

Tolerance for Validation

Due to the increased autonomy of customer transactions and associated risks associated with mobile shopping, retailers should consider exit inspections in order to reduce additional malicious and operational shrink. Although mobile shopping provides many conveniences for customers and retailers alike, exit inspections involve risks that need to be carefully considered before integrating such mechanisms into existing business processes. A major risk faced when introducing validation procedures is that customers will not tolerate exit inspections. There are many plausible reasons why customers may have negative reactions to exit inspections, including perception of an unfair process, reaction to changes in the validation process, increased inconvenience, feeling of being mistrusted by the retailer, and privacy concerns. We studied customer reactions towards each of these concepts in depth and explain below why it is critical to understand customers' tolerance levels for validation procedures when exiting stores. Below we explain some of the key concepts that are related to the consumer's willingness to accept exit inspections, i.e., presenting the paid shopping receipt in combination with purchased goods. The five aspects of tolerance we studied are:

- > Tolerance for unfair process
- > Tolerance for changes in validation process
- > Tolerance for inconvenience
- > Tolerance for mistrust
- > Tolerance for privacy intrusion

Tolerance for Unfair Process

Exit inspections might be viewed as an unfair process from a customer perspective because they may view them as a departure from what is the norm in retail. Customers are not used to exit inspections in the retail industry and they would need to adjust their fairness perceptions if retailers introduced exit inspections. Therefore, it is critical to understand how tolerant customers are towards the unfairness of the validation procedure. Among measures that retailers could take to reduce the perception of unfairness is to present the exit inspections not as a mandatory audit but as a process to assist customers with their transaction conducted by well-trained employees. A term like “customer service check” may be more effective to manage perceptions of the inspection.

Tolerance for Changes in Validation Process

Changing an existing process is difficult because customers dislike a disruption of their shopping routines. At present, exit inspections are not the norm in most retail stores and customers are used to leaving stores without being monitored and inspected. If validation processes change and exit inspections are introduced in combination with mobile shopping, the new validation procedures may interfere with a customer’s comfort with the shopping process. As a result, customers could feel annoyed, irritated, worried, scared, nervous or puzzled. Explaining that customers at all stores that use mobile POS were likely to be subject to similar checks could also help, as might framing the inspection as a means to help customers who were using the new technology.

Tolerance for Inconvenience

Inconvenience for customers is an important factor to consider when introducing exit inspections in combination with mobile shopping. Exit inspections can cause delays for customers if they have to wait in lines before they can exit the stores, and if they have to undergo a time consuming check. These delays are particularly likely in retail stores that have a high item-to-basket ratio because validation personnel will take a considerable amount of time to match the customer’s receipt with their shopping basket. Studies have shown that people are more tolerant of delays if they are told that it was for security reasons. Therefore, exit inspections framed as an exercise to ensure that their purchase is error free, and providing them and the store with increased assurance of a fair, safe and secure transaction, they are more likely to be tolerant of the inconvenience.

Tolerance for Mistrust

Mistrust of the customer by the retailer is another important concept to consider in the context of exit inspections in combination with mobile shopping. This is due to the fact that customers might feel that they are not being viewed as being sincere and retailers would not trust them. This seems particularly the case for recurring customers and frequent buyers because they believe to have established bonds with their retailer of choice. A possible negative reaction as a result of perceived lack of trust could be that customers are insulted and stop visiting the store as a result of exit inspections. In order to prevent against this occurrence, stressing the bond of loyalty with regular customers and exempting those who are trustworthy and have a high likelihood of an error-free transaction from the inspection may help. Also, framing the inspection as an audit may have an adverse effect and rather framing it as a customer service intervention designed to facilitate the transaction could be effective.

Tolerance for Privacy Intrusion

Customer privacy concerns are another critical aspect to take into account when introducing exit inspections in combination with mobile shopping. Exit inspections might be perceived as a privacy intrusion for customers because they may reveal information that makes customers feel upset, nervous or ashamed. Customers value their privacy and checking their bags they purchased might lead to negative reactions. Although it is natural for store employees to use the customer's purchases as a topic of conversation, in some cases, (unless the customer initiates the topic) it may not be desirable. It may be more effective to initiate conversation to keep the focus away from the audit function of the inspection, but to use other topics that do not have the potential to be perceived as an invasion of privacy.

Privacy Concerns toward Mobile Shopping

There are tremendous benefits associated with mobile shopping, but the associated privacy issues need to be examined because they could cause strong customer rejection. Customers have the perception that mobile shopping could be used to identify them in many more circumstances and could potentially lead to mobile spam based on prior purchases they made with a given retailer. As a result, many consumers are reluctant to purchase products using mobile technologies out of fear that the personal information they provide to the retail store could be compromised or misused. News

reports on identity theft, data breaches, and hacked bank accounts repeatedly report that customer information was inappropriately released. Further, despite the fact that mobile payment security mechanisms have similar high encryption standards as online interbank transfers, customers perceive mobile payments procedures as less secure. Hence, a thorough understanding of customers' privacy concerns is critical when considering implementing mobile shopping in retail environments. We studied customers privacy concerns towards mobile shopping in depth. Below we explain four key concepts that are related to the extent to which customers are disturbed about the information collection practices of others and how the acquired information will be used:

- > Privacy concerns – collection
- > Privacy concerns – errors
- > Privacy concerns – unauthorized access (improper access)
- > Privacy concerns – secondary use

Privacy Concerns – Collection

Customers dislike the mere collection of personal and credit card information via their mobile devices. In this scenario, customers provide financially relevant information to the retailer and they no longer maintain control over what is going happen with the information in future. Therefore, it is critical to understand how concerned customers are in a scenario when retailers collect information as part of mobile shopping. Studies show that there are two relevant insights related to customer concerns about the mere collection of data. They are subject to framing effects so if the default is that information is collected, they are more likely to allow the collection than of they were asked to opt in. Customers are also subject to the illusion of control, so that if they are explicitly allowed to opt out they are likely to allow collection without negative perceptions than if they were not allowed to opt out.

Privacy Concerns – Errors

Another concern that customers have regarding mobile shopping is that retailers' databases could include errors and might include inaccurate personal and credit card information. This could be caused by employees or due to outdated data (e.g., when a customer changes their cell phone number or receives a new credit card number), mistaken identity (another customer's history replaces or is merged), or other errors. Therefore, it is critical to understand

how concerned customers are in a scenario when errors may be a result of mobile shopping or outdated databases from retailers. Providing loyalty customers with access to their stored information with a quick and easy process to correct errors and omissions could be a way to provide them with perceived control, and consequently to allay their concern.

Privacy Concerns – Unauthorized Access (Improper Access)

Customers are concerned that unauthorized employees or hackers could access their personal and credit card information when using mobile shopping. To avoid unauthorized access to their information, customers expect strict internal controls and they want that retailers to do everything they can to protect their information, no matter how much it costs. Therefore, it is critical to understand how concerned customers are in a scenario when unauthorized individuals would access their personal information provided via mobile shopping. Studies show that customers deciding what to reveal about themselves confound control over publication of private information with control over access/use of that information by others. Therefore, allowing people the right to opt out from information collection is likely to suffice for them to allow collection.

Privacy Concerns – Secondary Use

When confronted with mobile shopping, customers are concerned that retailers would use their personal and credit card information for purposes other than what they have authorized. Examples for secondary use of sensitive customer information would be unauthorized marketing campaigns (e.g., promotional SMS messages) or selling information to other retailers and marketing companies. Therefore, it is critical to understand how concerned customers are in a scenario when their personal information would be used for other reasons or by other entities. An assurance that the data will not be used for other purposes without explicit permission from the customer may be effective in alleviating concerns.

The most critical findings in terms of customers' tolerance for validation and privacy concerns are summarized in Exhibits 9-10. In these Exhibits, check marks are used to indicate the importance with three check marks indicating the effect is very strong and one check mark indicating a mild effect.

Mobile Point-of-Sale and Loss Prevention: An Assessment of Risk **Risks** Customer Perspective

Gender Comparison

Overall, as shown in Exhibit 9, there are no gender differences in the influence of inhibitors (tolerance for validation and privacy concerns) on the intention to use mobile shopping. However, women are more influenced than men are by both utilitarian benefit from using the mobile shopping channel and the hedonic aspect—i.e., shopping experience.

	Men	Women
Utilitarian benefit	✓	✓✓
Shopping experience	✓✓	✓✓✓
Tolerance for validation	✓✓	✓✓
Privacy	✓✓	✓✓

Exhibit 9 Gender Comparison

Age Comparison

Overall, as shown in Exhibit 10, the tolerance for validation and privacy concerns have a greater negative influence on the intention to use mobile shopping for customers over 40 years of age than those under 40 years of age. Also, intention to use for those under 40 years of age is most influenced by the hedonic aspect—i.e., shopping experience.

	< 40	> = 40
Utilitarian benefit	✓	✓
Shopping experience	✓✓✓	✓✓
Tolerance for validation	✓	✓✓
Privacy	✓	✓✓

Exhibit 10 Age Comparison

Gender-Age Comparison

Interestingly, as shown in Exhibit 11, we find gender and age together have an effect as among those under-40, the intention to use for women is a little more influenced by the utilitarian benefit than it is among men and also a little less inhibited by privacy concerns than it is among men. Among those over-40, women are much more motivated to use mobile shopping because of the benefits, both utilitarian and hedonic (i.e., shopping experience).

	Men < 40	Men >= 40	Women < 40	Women >= 40
Utilitarian benefit	✓	✓	✓✓	✓✓✓
Shopping experience	✓✓✓	✓	✓✓✓	✓✓✓
Tolerance for validation	✓✓	✓✓	✓✓	✓✓
Privacy	✓✓	✓	✓	✓✓

Exhibit 11 Gender-Age Comparison

Income Comparison

As shown in Exhibit 12, the intention to use mobile shopping is much more influenced by the utilitarian benefit among those with an income greater than \$100,000 in comparison to the balanced set of drivers for those with an income less than \$100,000. Further, higher income customers are not influenced by the shopping experience at all.

	> 100K	< 100K
Utilitarian benefit	✓✓✓	✓
Shopping experience		✓
Tolerance for validation	✓✓	✓
Privacy	✓	✓

Exhibit 12 Income Comparison

Validation Procedure Comparison

As shown in Exhibit 13, comparing the different shopping channels (various mobile POS scenarios and traditional shopping), we observe some differences in the drivers and inhibitors to adoption. Although there is no difference in the effect of utilitarian benefits, we do observe that across the board, the shopping experience is a driver for mobile channels in comparison to its role in traditional shopping. We also see that privacy concerns are an inhibitor that may deter customers from adopting a mobile channel in comparison to its role in traditional shopping. Finally, in just the customer with phone mobile channel, the tolerance for validation is an inhibitor that may deter adoption in comparison to its role in traditional shopping. We see no evidence that tolerance for validation will be a significant inhibitor in a comparison of traditional shopping to the other mobile channels.

Mobile Point-of-Sale and Loss Prevention: An Assessment of Risk

Risks Customer Perspective

	Employee with mobile device	Customer with store mobile device	Customer with cell phone	Traditional shopping scenario
Utilitarian benefit	✓✓	✓✓	✓✓	✓✓
Shopping experience	✓✓	✓✓	✓✓	
Tolerance for validation	✓	✓✓	✓✓✓	✓✓
Privacy	✓	✓✓	✓✓	

Exhibit 13 Key Emerging Scenario Comparison

Effectiveness of Deterrence Methods: Key Emerging Scenario Comparison

As shown in Exhibit 14, comparing across various mobile shopping channels, the most effective deterrent to shoplifting across the board is alert employees. Although video surveillance is a close second in most scenarios, it is not perceived to be an effective deterrent at all in the employee with mobile device scenario.

	Employee with mobile device	Customer with store mobile device	Customer with cell phone	Traditional shopping scenario
Video	6%	26%	29%	26%
Store employees	53%	36%	36%	31%
Random checks	18%	14%	18%	13%
Registration	23%	24%	17%	30%

Exhibit 14 Deterrence Methods

Deterrence Methods Comparison

In comparison, the survey of shoplifters revealed that video and customer registration were viewed as the most effective deterrents to shoplifting. As shown in Exhibit 15, the shoplifter focus group revealed that they knew that store employees were too busy to

"I THINK SHOPLIFTING WILL HAPPEN AT A CONSISTENT RATE, REGARDLESS OF HOW MUCH SURVEILLANCE A STORE HAS (BE IT CAMERAS, CART-EXAMINING ON EXIT, ETC). I FEEL LIKE ALL ATTEMPTS TO PREVENT SHOPLIFTING DON'T ACTUALLY AFFECT SHOPLIFTERS, JUST REGULAR SHOPPERS. THE BEST EXAMPLE OF THIS IS SELF-CHECKOUT WHERE ITEMS ARE WEIGHED. I'VE NEVER SHOPLIFTED, BUT SELF-CHECKOUT SYSTEMS SEEM TO THINK THAT MY ITEMS ARE EITHER TOO HEAVY OR TOO LIGHT, SO I ALWAYS END UP NEEDING A STORE EMPLOYEE TO CHECK ME OUT ANYWAYS. I HATE THIS, BECAUSE SELF-CHECKOUT IS MEANT TO SAVE TIME WHEN REGULAR CHECKOUT LINES ARE TOO LONG!" **Customer (male, 20-29)**

conduct more than cursory exit checks. The shoplifter focus group also revealed that they were experienced with distraction and so were confident in their ability to circumvent monitoring by store employees. Our visits with technology providers revealed that modern video surveillance cameras had the ability to track customers as they walked the sales floor and that the resolution was good enough to read a receipt. Shoplifters are indeed apprehensive about this deterrent. Shoplifters are also very concerned with any means whereby they could be identified and therefore they avoid shoplifting in situations which require customer registration.

Effectiveness of Deterrence Methods	
Video	37%
Store employees	18%
Random checks	14%
Registration	31%

Exhibit 15 Deterrence Method Comparison among Shoplifters in a Mobile Shopping Context

As shown in Exhibit 16, customers report that employee involvement after the transaction (employee assistance on completion) to be the most intrusive form of validation. They however report that employee involvement before the transaction (employee engagement) is the least intrusive form of validation.

	Most intrusive	2nd most intrusive	3rd most intrusive	4th most intrusive	Least intrusive
Corralling	14	31	43	7	6
Data analytics	16	15	26	18	25
100% audit	15	23	15	27	22
Employee engagement	18	15	10	26	30
Employee assistance on completion	37	16	6	22	17

Exhibit 16 Validation Approach Intrusiveness (Percentages)

Ease of Shoplifting Comparison

Among various approaches to validation, customers perceive that it is easiest to shoplift with exit inspections based on mobile phones. As shown in Exhibit 17, they perceive that it is easier to shoplift with mobile phone checkout processes in comparison to employee engagement in the store.

Shoplifter Perceptions of Ease of Shoplifting	
Traditional assisted checkout	26%
Mobile phone	42%
Store mobile device	14%
Employee with mobile device	16%

Exhibit 17 Ease of Shoplifting in Various Mobile Scenarios

Further, shoplifters perceive that it is easiest to shoplift in the customer mobile phone scenario, presumably because of the increased autonomy. They perceived it harder to shoplift in the customer with mobile device and employee with store mobile device scenarios. Because the customer with a store mobile device involves customer registration and because the employee with mobile device scenario involves a credit card rather than cash payment (both of which ID the customer), this is not too surprising (as shown in Exhibit 18).

	Easiest	2nd most difficult	3rd most difficult	4th most difficult	Most difficult
Corralling	23	34	4	35	6
Data analytics	26	27	6	24	17
100% audit	21	21	6	26	26
Employee engagement	19	15	15	12	39
Employee assistance on completion	11	3	69	3	12

Exhibit 18 Ease of Shoplifting in Various Validation Conditions (Percentages)

Shoplifter Focus Groups

Based on the data from the two focus groups, we identified three types of shoplifter, each with different motivations, capabilities, targets, and methods. We label them as follows:

1. **Amateurs** People motivated by desire (though not need) who steal objects for their own use. Such individuals in the focus group were young and lower income but not disadvantaged. They had been apprehended for theft, but were repeat offenders. They did not steal for resale and their targets were almost anything including apparel, accessories, and grocery.
2. **Professionals** People who steal for a living typically steal for resale. Such individuals in the focus group were economically disadvantaged and they worked with others to execute an act of theft. They were selective in their targets, as they would only steal items for which they had an outlet for resale.
3. **Kleptomaniacs** People driven by psychological motivations and not by need. Such individuals in the focus group were affluent professionals (including a physician and a top-level manager). They did not steal for resale and although their typical target was apparel and accessories at department stores, they would sometimes steal other objects because of their need to steal. They had never been caught despite long histories of offending but were attending a support group to try to kick the habit.

The primary findings from the shoplifter focus groups are:

1. All shoplifter types that we identified in the focus groups (amateurs, professionals, and kleptomaniacs) rely on distraction or diversion to cover an act of theft (such as concealing an item on their person). For example, professionals will have a confederate engage with a store employee and stand between the store employee and the shoplifter so that they mask the act of concealment. In a mobile scenario, they could make a scanning motion without activating their mobile phone app.
2. Professionals and affluent shoplifters stated that they would never shoplift on a store visit in which they had revealed their ID (by using a credit card for example). Therefore, shoplifters using mobile checkout scenarios, such as mobile self-scan (with phone or store device) that requires customer registration, would not shoplift on that visit.

3. Professionals stated that it was unlikely that the addition of a mobile shopping channel in the store would impact any of their usual shoplifting activities, such as leaving without paying and concealing some items at checkout. With the exception of increased checks at the exit, there was no reason why it would make these activities either easier or more difficult.

4. Professionals and amateurs stated that they usually learned about store processes and surveillance from the inside – either by working in the retail industry or from friends who worked for the store. Professionals especially did not shoplift unless they knew what surveillance methods a store had in place. They did not expect mobile checkout to change their activities in the short run, as there was nothing that prevented them from activities they were already engaged in and they could see no immediate new opportunities that could be exploited. However, they were confident that once the new checkout processes were operational that they would figure out new ways to exploit the system—“it was only a matter of time,” said one shoplifter.

Mobile Point-of-Sale and Loss Prevention: An Assessment of Risk **Risks** Customer Perspective

RISK CHECKLIST

In evaluating the risks, firms can consider the three key processes identified earlier. The risk checklist shows the various specific risks associated with each of the three processes. We then discuss how the risk checklist can be specifically used in various contexts. The various solutions that can be used to manage the risks are also discussed.

Processes and Risks

SCANNING	Technology	Non-scan
		Battery-life
		Wireless failure
		Other system failures
	Employee	Fear of layoffs
		Inability to master technology/ resistance to change
		Impatience with customers
		Opportunity for employee-aided loss
		Apathy toward increased shrink
	Retailer/ Store	Large footprint stores with invisible spots
		Reduced opportunity to upsell and cross-sell
		Erroneous customer accusation
		Increased technology, equipment, and other costs

Mobile Point-of-Sale and Loss Prevention: An Assessment of Risk Risk Checklist

		Bagging
		Warranty
		Staffing for assisted mobile checkout
	Product Risk	Bulk, produce, and loose items
		Age restricted, identity required, and prescription
	Customer Risk	Privacy concerns
PAYMENT	Technology	Non-scans
		Battery-life
		Wireless failure
		E-receipt delay on mobile device
		Other system failures
	Employee	Fear of layoffs
		Inability to master technology/ resistance to change
		Impatience with customers
		Opportunity for employee-aided loss
		Apathy toward increased shrink
	Retailer/ Store	Negative impact on aesthetics
		Reduced opportunity to upsell and cross-sell
		Erroneous customer accusation
		Increased technology, equipment, and other costs
		Bagging
		Warranty
		Staffing for assisted mobile checkout
	Product Risk	Age restricted, identity required, and prescription

Mobile Point-of-Sale and Loss Prevention: An Assessment of Risk Risk Checklist

	Customer Risk	Privacy concerns
VALIDATION	Technology	Non-scans
		Battery-life
		EAS device removal and deactivation
		Wireless failure
		E-receipt delay on mobile device
		Other system failures
	Employee	Inability to master technology/ resistance to change
		Impatience with customers
		Opportunity for employee-aided loss
		Apathy toward increased shrink
	Retailer/ Store	Large footprint stores with invisible spots
		Multiple exit points
		Negative impact on aesthetics
		Reduced opportunity to upsell and cross-sell
		Erroneous customer accusation
		Bagging
		Staffing for assisted mobile checkout
	Product Risk	Bulk, produce, and loose items
		Age restricted, identity required, and prescription
	Customer Risk	Tolerance for validation
		Privacy concerns

This checklist, drawn from the framework developed, presents an operational guide to managing the assessment of risk related to mobile POS by asking you to provide the following two sets of information for each identified risk component. In order to identify both the importance and expected/current performance, it is advisable to

seek multiple opinions to perform the evaluations—for instance, in assessing employee risk, it may be prudent to get the input of IT managers who will implement the technology because they have prior knowledge about employee risks, store managers who will have knowledge of employee reactions to prior technologies, and a small group of employees to assess their feelings directly.

The first set of information relates **to how important you believe** each risk component is to your firm and its operations. The scale is weighted from 0 to 100 (percent), with 0 indicating that it is “not at all important” to 100 indicating that it is “extremely important.” Note that this weight is used to assess the importance of the risk and not how well your firm performs on the factor, which is next. The total weight of risk factors in each category should add up to a 100%. This approach is called a constant sum method and emphasizes the need to understand and identify the most major risks and prevent the selection of all risks at a weight of 100.

The second set of information relates to **how well your firm manages or is expected to manage the risk**. This is on a scale from 0 to 100 where 0 is extremely good and 100 is extremely poor.

The weighted score assesses the risk associated with each factor and is computed as a product of (a) and (b). The higher the weighted score, the higher the risk. In order to manage risk, firms should specifically focus on highly weighted (high importance) risk factors that are evaluated poorly. The last column provides specific actions that should be taken to manage each risk.

Mobile Point-of-Sale and Loss Prevention: An Assessment of Risk Risk Checklist

Technology Risk

Risk Component	Description of Risk	Risk Importance (a)	Risk Evaluation (b)	Weighted Risk Score (a) x (b)	Possible actions to be taken to manage risk
Non-scans	Customers scan is not recorded, increasing operational shrink				Provide feedback such as a “swoosh” sound to customers on successful scans.
Battery-life	Customers mobile phone does not have sufficient life for a shopping visit				Provide a warning about remaining battery life when a customer begins a shopping visit.

Risk Component	Description of Risk	Risk Importance (a)	Risk Evaluation (b)	Weighted Risk Score (a) x (b)	Possible actions to be taken to manage risk
EAS device removal and deactivation	Products are tagged with EAS devices which need to be removed				Provide an exception process notifying the customer that they have to take certain EAS tagged devices to a store employee. Also, allow customer to remove EAS devices if the removal can be synced to trigger a sale record.
Wireless failure	Customers and store employees cannot complete transaction due to wireless failure				Provides backup 3G/4G systems that kick in when wireless fails.
E-receipt delay on mobile device	If an e-receipt is necessary for validation, non-receipt can result in inconvenience for customer				Train employees to handle e-receipt exceptions with caution, avoiding theft accusations.
Other system failures	Customer or store employee cannot complete transaction				Train and authorize employees to provide customers with compensation for system failure so that they do not see it as a reason to avoid mobile POS.
		100%			

Employee Risk

Risk Component	Description of Risk	Risk Importance (a)	Risk Evaluation (b)	Weighted Risk Score (a) x (b)	Possible actions to be taken to manage risk
Fear of layoffs	Fear that technology will replace human labor				Reassure employees that any labor savings will be used to repurpose employees for other store operations and for enhancing customer service.
Inability to master technology/ resistance to change	Re-engineering job descriptions and task processes may be unpopular				Design and provide adequate training for store employees that directly and indirectly service and support mobile POS channels.

Risk Component	Description of Risk	Risk Importance (a)	Risk Evaluation (b)	Weighted Risk Score (a) x (b)	Possible actions to be taken to manage risk
Impatience with customers	Customers learning new shopping processes need to be handled with patience				Employee protocols that stress the need to educate customers how to use the new checkout processes, as well as help enhance the shopping experience.
Opportunity for employee-aided loss	Shoplifters may be able to learn about checks and balances designed for mobile POS from employees				Design and implement checks and balances for employees servicing and supporting mobile POS.
Apathy toward increased shrink	With increased customer autonomy, employees may not feel responsible for transactions and related loss				Motivate employees with incentives and other means to monitor mobile shopping channels.
		100%			

Retailer/Store Risk

Risk Component	Description of Risk	Risk Importance (a)	Risk Evaluation (b)	Weighted Risk Score (a) x (b)	Possible actions to be taken to manage risk
Large footprint stores with invisible spots	Video and human surveillance is limited				Dummy cameras and motion activated devices that blink or beep could increase the perception of monitoring.
Multiple exit points	Validation is difficult because it is not possible to funnel customers				Corralling customers or separating them by their checkout channel at the point of checkout before they approach an exit may facilitate validation.
Negative impact on aesthetics	Physical store design that facilitates validation may detract from store aesthetics				Funnel customers to separate checkout lanes without physical barriers, so that there is a more open feel to the checkout area.

Risk Component	Description of Risk	Risk Importance (a)	Risk Evaluation (b)	Weighted Risk Score (a) x (b)	Possible actions to be taken to manage risk
Reduced opportunity to upsell and cross-sell	With increased customer autonomy there are fewer touch points with customers				Engage with customers through their mobile phone by providing product information, product reviews, and product recommendations based on their scans.
Erroneous customer accusation	Technological failure can result in customers being erroneously accused of theft				Design protocols for exit inspections and how employees handle exceptions when items in a basket do not match a receipt or when no receipt is available.
Increased technology, equipment, and other costs	The hardware and systems to implement mobile POS can be expensive				Look for opportunities to offset costs by reduced labor costs at checkout, reduced expenditure on cash registers, and increased revenues from increased customer satisfaction.
Bagging	The process for bagging items should not detract from customer convenience				Bagging stations on the store floor and bags in shopping carts. Reusable bags.
Warranty	The process for product registration should not detract from customer convenience				Electronic kiosks or a manned warranty station near the exit.
Staffing for assisted mobile checkout	Employees need to be readily available to provide assisted mobile checkout				Staff optimization software ensuring sufficient store employees based on store traffic patterns. Stationing of store employees on the sales floor in zones.
		100%			

Product Risk

Risk Component	Description of Risk	Risk Importance (a)	Risk Evaluation (b)	Weighted Risk Score (a) x (b)	Possible actions to be taken to manage risk
Bulk, produce, and loose items	Products that do not have a barcode need to be scanned				Weighing stations that can print barcodes for bulk, and barcodes can be posted on the shelf for loose items.
Age restricted, identity required, and prescription	Products that need employee intervention need to have an exception process				Employee-staffed stations for verification.
		100%			

Customer Risk

Risk Component	Description of Risk	Risk Importance (a)	Risk Evaluation (b)	Weighted Risk Score (a) x (b)	Possible actions to be taken to manage risk
Tolerance for validation	Tolerance for perceived unfairness of the process				Presenting the exit inspections not as a mandatory audit but as a process to assist customers with their transaction conducted by well-trained employees. A term like “customer service check” may be more effective to manage perceptions of the inspection.
	Tolerance for process changes from the status quo				Explaining that customers at all stores that use mobile POS were likely to be subject to similar checks. Also framing the inspection as a means to help customers who were using new technology.
	Tolerance for inconvenience because of delays and the extra effort to present information to the store employee				Keeping conversation to a minimum, and designing protocols for targeted test checking of baskets. Identifying known to be trustworthy customers and exempting them from inspections.

Risk Component	Description of Risk	Risk Importance (a)	Risk Evaluation (b)	Weighted Risk Score (a) x (b)	Possible actions to be taken to manage risk
	Tolerance for the display of mistrust by the retailer				Disguising the audit focus of the inspection, and providing appreciations and more tangible rewards for loyal customers as well as those who could potentially become regular customers. Identifying customers know to be trustworthy and exempting them from inspections.
	Tolerance for privacy intrusion				Training employees not to comment on the purchases, but to converse on other topics.
Privacy concerns	Concern about the mere collection of private data				Offering customers the option to opt out of the collection of their private information, with a statement of tangible benefits in return for allowing such collection (e.g., entry to a lottery, discounts,...). It is important that the customer has perceived control over the decision to opt in or to opt out. A publicized policy that reassures customers that data is scrubbed and aggregated so that no individuals can be identified.
	Concern about errors and inaccurate data about the customer				Providing loyalty customers with access to their stored information with a quick and easy process to correct errors and omissions.
	Concern about unauthorized (improper) access to private data				A default that the information will be collected, but an explicit option for customers to opt out if they so choose to do so.
	Concern about unauthorized secondary use				An assurance that the data will not be used for other purposes without explicit permission from the customer.
		100%			

CONCLUSION

We conducted a series of studies to better understand 'mobile point-of-sale and loss prevention'. We identified several challenges that retailers will face when considering ubiquitous transactions using mobile technologies in the store, but we also believe that several of the pitfalls can be circumvented and the challenges overcome.

Understanding the potential risks due to a still emerging technological innovation, such as mobile POS, that involves internal and external constituents, people, processes and still nascent technologies, requires a triangulation of available data sources. Our research took a multi-method approach to developing a risk framework, using qualitative interviews and focus groups, surveys that provide quantitative data, and action research that grounds the information that may be obtained from other sources.

The risk framework reports on risks from five different perspectives: a customer perspective that includes shoplifters in addition to others, a technology perspective, a retailer/store perspective, an employee perspective, and a product perspective. Although each of these perspectives cannot be viewed totally in isolation, this organizing framework helps to identify and to understand issues relevant to the several aspects of risk that may arise in store environment with mobile POS.

It is important to qualify the research findings and issues raised by noting that these are not specific to a single type of retailer. From an industry perspective, with retailers with very different store formats, geographical spreads, product assortments, employee training, corporate cultures and customer bases, these general findings need to be interpreted and applied to the specific context of each retailer.

“OUR
RESEARCH
TOOK A
MULTI-
METHOD
APPROACH
TO
DEVELOPING
A RISK
FRAMEWORK.”

With the increased autonomy that a customer experiences with mobile transactions, some of the built-in checks and balances that help mitigate risks are removed. In the past, most transactions were store employee assisted and three components were conducted at a single location—i.e., scanning, payment, and validation. Mobile checkout processes that change one or more of the co-location, timing, sequence, and performing agent of the three checkout components challenge the retailer to redesign processes to build in new checks and balances. In doing so, there are three major issues that emerge from a customer perspective:

- (1) One size does not fit all: customers who adopt mobile POS technology are likely to be segmented by age, gender, and income;
- (2) Privacy concerns are an inhibitor to adoption; and
- (3) Tolerance for validation in the form of exit inspections have to be carefully managed.

We cataloged some possible solutions that could be used to deal with privacy and tolerance issues. We also identified risks from other perspectives and present solutions that will allow retailers to mitigate that risk. The framework, findings, and proposed solutions should serve as a launching pad for retailers to investigate their own unique situations and to achieve success with mobility initiatives. This new world of mobile POS that enables ubiquitous transactions in the store has many potential pitfalls and presents many challenges for retailers, but we believe that the pitfalls can be circumvented and the challenges overcome.

APPENDIX 1

Research Method

Mixed methods research is suited to develop rich insights of an underlying phenomenon. We investigated mobile point-of-sale and loss prevention by employing four methods, namely (1) literature review, (2) customer study, (3) expert study (technology/ loss prevention / mobile/ retail experts), and (4) shoplifter study.

Mixed Methods Research and Associated Benefits

We applied a mixed methods research approach for our risk assessment for mobile point-of-sale. Mixed methods research combines quantitative (e.g., customer surveys), qualitative (e.g., focus group discussions), and action research (e.g., going through mobile checkout processes as customers) methods. The main goal of mixed methods research is developing rich insights that cannot be fully understood using only quantitative or a qualitative methods.

The interested reader is referred to a recent extensive treatise on mixed methods². We abstract and highlight a few key benefits commonly associated with mixed methods research.

First, mixed methods research can provide answers to confirmatory and exploratory research questions simultaneously. Qualitative methods are typically used for exploratory research in situations in which little is known about a phenomenon, especially in future scanning studies that seek to whereas quantitative methods are typically applied for confirmatory studies, i.e., situations where the researcher already has an understanding of the research context but seeks to prove or to disprove beliefs as well as to quantify parameters. Mixed methods research, by combining both qualitative and quantitative methods, has the ability to address both exploratory and confirmatory questions within the same research inquiry.

²See Venkatesh, V., Brown, S. A., & Bala, H. (2013). Bridging the qualitative-quantitative divide: Guidelines for conducting mixed methods research in information systems. *MIS Quarterly*, 37(1), 21-54.

Second, by combining inferences from both qualitative and quantitative investigations, mixed methods research can leverage the complementary strengths of qualitative and quantitative methods and provide insights on a phenomenon that each of these methods separately cannot provide. For example, interviews and focus group discussions, both qualitative data collection methods, provide in depth data allowing researchers to gain deep insights from rich narratives and comments provided by focus group participants. Survey research (e.g., consumer surveys), a quantitative data collection method, can bring breadth to a study and helps researchers gather data about a phenomenon from a large variety of participants. Together, these two data collection methods are helpful for making better and more accurate inferences—i.e., meta-inferences. Meta-inferences are an integrative view of findings from qualitative and quantitative elements of mixed methods research.

Finally, mixed methods research provides an opportunity for obtaining divergent and/or complementary views. While conducting mixed methods research, a researcher may find different (e.g., contradictory and complementary) conclusions from the quantitative and qualitative studies. Such divergent findings help re-examining the conceptual framework and the assumptions underlying each of the two strands of mixed methods research.

Due to this, we felt that a mixed methods approach was particularly suited for achieving a holistic understanding of mobile point-of-sale and loss prevention for which we found documented knowledge was fragmented, inconclusive, and equivocal.

Our Research Approach

Given the strengths of mixed methods research, we initiated the mobile point-of-sale and loss prevention study by systematically planning a course of action consisting of four core areas, namely (1) literature review, (2) customer study, (3) expert study (loss prevention / mobile experts), and (4) shoplifter study. We conducted the literature review in order to understand what prior research and practitioner-based reports have discovered regarding mobile technologies and loss prevention. The customer study was conducted to understand customers' reactions toward mobile technologies in retail environments. We conducted the expert study in order to better understand issues related to shrink in mobile POS scenarios and possible strategies towards reducing shrink. We conducted the shoplifter study to learn about how technologies could influence motivations to shoplift in stores. By using a sequential mixed methods approach, we felt we would gain a rich but also holistic understanding of the risk assessment of mobile POS and loss prevention. Exhibit 19 illustrates our research approach

including the four core research areas we investigated. Each core area is explained in more detail below.

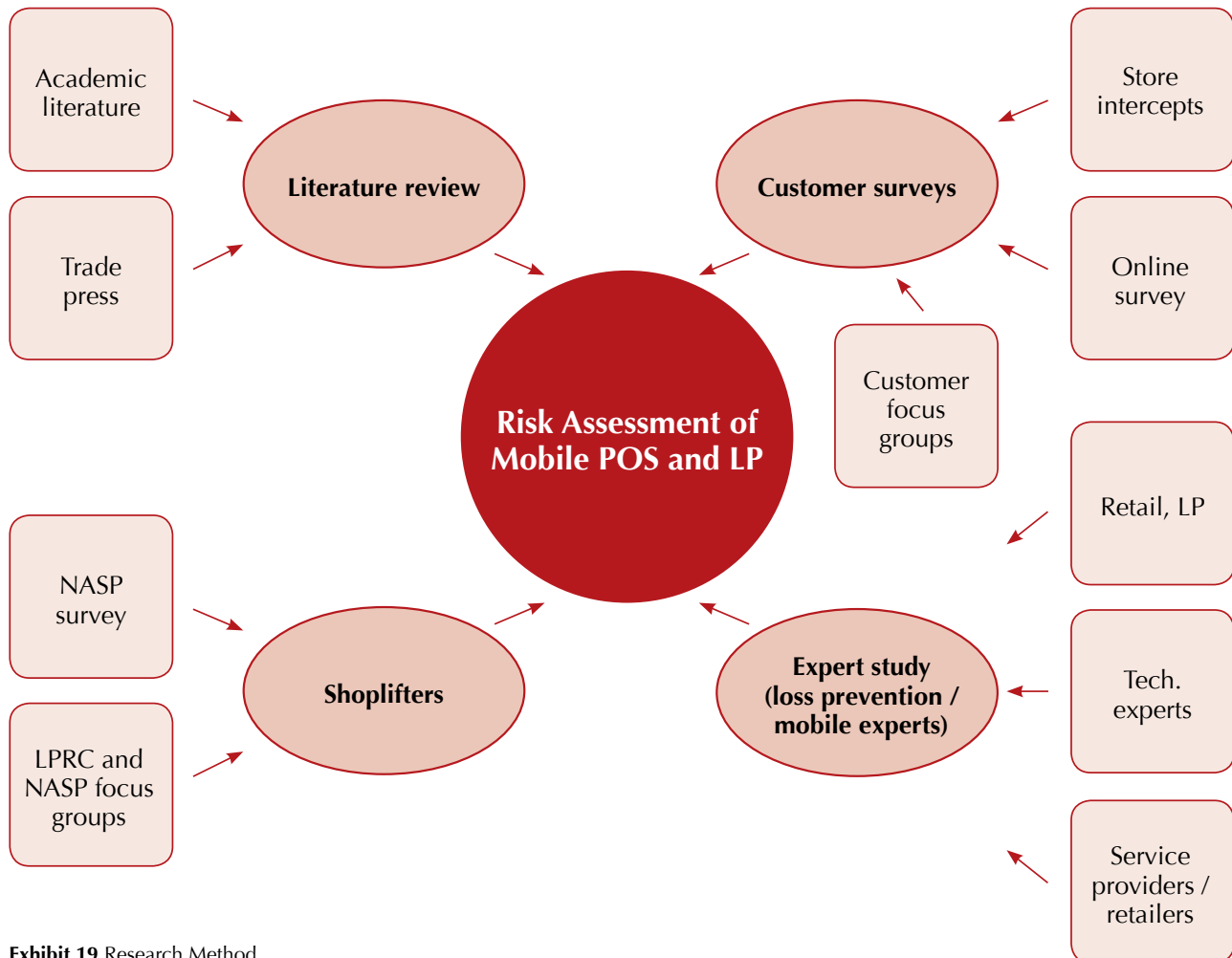


Exhibit 19 Research Method

Literature Review

We initially screened the existing academic and trade press literature to better understand the state-of-the-art of research in the field. Our main goal was to establish a broad portrait of the existing literature on mobile point-of-sale and loss prevention in a retail context. We felt that having an overview of what previous studies have found in these areas would provide us with necessary background as well as inform our research strategy. In order to identify relevant literature, the steps we followed as part of our literature review were:

- > Identifying, reviewing and analyzing the existing literature on mobile technologies from a store/retailer perspective, employee

perspective, product perspective, customer perspective, and technology perspective;

- > Identifying, reviewing and analyzing the existing literature on loss prevention from a store/retailer perspective, employee perspective, product perspective, customer perspective, and technology perspective.
- > Because we felt that research in these areas has been published across various research disciplines (e.g., supply chain management, IT/IS, marketing), we anticipated that relevant articles would be published across various journals. In order to cover a broad range of journals and practitioner outlets, we searched the bibliographic databases shown in Exhibit 20.

Online Database	Subject focus
ABI/Inform Database	Business and management
Business Source Premier	Marketing, business, economics, management
Google Scholar	Web search engine for scholarly literature across an array of disciplines
IEEE Xplore	Engineering and computer science
Inderscience Publishers	Electronic commerce, management, information systems
Proquest	Arts, business, science, law, psychology, social science
Science Direct	Computer science, economics, business and management, social sciences

Exhibit 20 Online Databases for the Literature Search

We conducted a keyword search on these databases in order to identify relevant literature. The search strategy included various keywords, such as mobile technology, mobile payments, mobile scanning technology, retail technology, validation process and loss prevention. Next, we carefully studied and analyzed the identified articles.

In summary, we found a considerable amount of academic research on mobile and alternative self-service retail technologies (e.g., Internet shopping applications). We also found that academic research typically studied self-service shopping technologies and it seemed that existing research has prioritized alternative topics, such as consumers' trust, privacy and usability perceptions in the context

Mobile Point-of-Sale and Loss Prevention: An Assessment of Risk Appendix 1

of mobile technologies in retail environments. We found several practitioner-based articles reporting that retailers and application providers have started exploring mobile technologies. Although there was a significant amount of practitioner-based literature that pointed out the increasing infusion of mobile technologies into retailers' in-store operation, we were unable to identify any specific articles that reported strategies to prevent loss in a mobile POS context.

In order to develop a holistic understanding of the risk assessment of mobile POS and loss prevention, we applied a sequential mixed methods design to study mobile POS and loss prevention through the lens of three groups of people, namely customers, loss prevention and technology experts, and shoplifters. Herein, we follow one method (e.g., focus groups) by another (e.g., survey) and use the findings from the first method to guide the investigation in the second method.

Customer Study

For our customer survey, we collected data in three separate stages: (1) store intercept surveys, (2) focus group discussions, and (3) customer survey. The first two stages were exploratory in nature and we aimed to gain a deep understanding of customers' perceptions towards mobile technologies in retail environments. The customer survey was designed to capture data from a large variety of participants and to confirm the findings obtained during the first two stages.

Store Intercept Surveys

We conducted store intercepts at three retailers in northwest Arkansas (a home improvement retailer, a general merchandise retailer, and a department store). Customers, who had completed their shopping, voluntarily completed a 10-minute survey (see Appendix) that captured their attitude toward and opinions on mobile POS scenarios. There were 27 configurations of scanning and payment scenarios, and each customer saw a description with visuals of one of these configurations. There were about 200 participants in this survey.

Focus Group Discussions

We conducted two focus group sessions of 60-90 minutes to better understand customers' perceptions towards mobile technologies in a retail context. The literature review and store intercept surveys provided us with initial information on the drivers and inhibitors of mobile technologies in retail stores from a customer perspective that we then further explored in two focus groups consisting of 32 customers and 21 customers respectively.



Data collection was carried out through semi-structured focus group discussions including open-ended questions. Each focus group discussion lasted approximately 60-90 minutes and was moderated by one of the researchers. The interview recordings were transcribed after the focus group discussions. To analyze the data, coding procedures were applied with a goal to identify similarities or differences between the responses of the participants.

Online Survey

We developed a scenario-based study in which consumers were presented with 27 mobile shopping scenarios (see Appendix 2 for a more detailed description) and asked how they would respond. We drew the sample from the target population of a general consumer pool that was developed to represent the US population. All data were collected using an electronic survey that was administered by a professional third-party organization.

The survey provided contextual information on what mobile shopping scenarios could look like and to assure that all respondents answered the questions with a common understanding of the core issue. To infuse vividness, we included images that further illustrated the processes described in a given scenario.

Most questions were adapted from prior studies and contextualized for the mobile shopping environment. We also circulated preliminary versions of the survey to RILA members and received feedback on our questions. In addition, members suggested questions to include in the survey instrument. All questions were measured using a seven-point scale that referred to: (1) strongly disagree, (2) disagree, (3) somewhat disagree, (4) neither agree nor disagree, (5) somewhat agree, (6) agree and (7) strongly agree. We also captured appropriate demographic variables including gender, age, income and job.

We also gathered customer perceptions toward exit inspections that could take place in retail stores. In this survey, respondents were asked to imagine either using their mobile phones or store devices to scan products on a shopping trip. Then, once they are about to checkout, they could either pay using their smartphone or find a store employee who could obtain payment from them anywhere in the store. Next, we informed the respondents that retail stores face the risk of customers either intentionally or unintentionally taking products out of the store for which they have not paid. To ensure that such mistakes would not happen and to minimize loss, stores would consider five different methods of auditing customers, namely corralling, audit based on data capture and analytics, 100% audit, employee engagement and monitoring, and employee assistance on completion of transaction.

Next, we asked the respondents a series of questions related to these scenarios. These questions aimed to understand the effectiveness and customer reactions toward these auditing methods. Another focus of our survey was to find out about customers' privacy concerns regarding each validation approach.

In the two surveys (scenario survey and mobile validation survey), we collected a total of 1,190 responses. Exhibit 21 includes information on the respondent demographics.

Mobile Point-of-Sale and Loss Prevention: An Assessment of Risk Appendix 1

		Scenario survey	Mobile validation survey
Demographic	Category	n = 1090	n = 100
Gender	Men	501	45
	Women	589	55
Age groups	Under 20	44	5
	20-29	684	64
	30-39	215	23
	40-49	67	5
	50-59	54	2
	60 or older	26	1
Income (Annual, in USD)	0-10,000	122	17
	10,000-19,000	114	16
	20,000-29,000	128	11
	30,000-39,000	117	8
	40,000-49,000	116	6
	50,000-74,000	209	22
	75,000-99,000	123	9
	100,000-150,000	107	9
	Over 150,000	54	2
Job	ICT	118	11
	Banking and Finance	44	3
	Insurance, Real Estate, Legal	17	1
	Government and Military	28	3

	Construction, Engineering	30	4
	Retail and Wholesale	17	2
	Education	137	11
	Marketing and Advertising	36	3
	Student	303	35
	Other	360	27

Exhibit 21 Respondent Demographics

Shoplifter Survey

We report the results of a survey of shoplifters who had been detected and who were enrolled in an online course on shoplifting conducted by the National Association for Shoplifting Prevention. The survey included questions on shopping in a mobile POS enabled store, which were designed to get at how shoplifters might view this as an opportunity relative to a traditional store.

Expert Study

Retail loss prevention experts participated in two focus groups. The first focus group probed for mobile POS scenarios that had emerged or which might emerge in the near future. The second focus group investigated loss prevention risks that would be a result of this store innovation, and also elicited opinions on possible preventative measures that could ameliorate these risks.

We conducted several in-person and/or phone interviews as follows:

- > 19 loss prevention experts from 16 retail firms (30 minutes each)
- > 8 experts from 3 consulting companies experienced with retail and/or payment (1-2 hours each)
- > 7 experts from 2 EAS device providers (3-4 hours each)
- > 10 experts from 6 POS/scanning device manufacturers (1-2 hours each)
- > 6 experts from 3 other technology device/software providers (30 minutes-1 hour each)

We attended three retail industry conferences, two of which also included technology exhibits by providers.

We were also given in-depth explanations as we inspected onsite displays of equipment and technology at several of the providers as well as at the Metro future store in Dusseldorf, Germany.

APPENDIX 2

Mobile Point-of-Sale and Loss Prevention: An Assessment of Risk Appendix 2

Mobile Assisted Scanning and Mobile Self-service Payment (NFC)

Thank you for agreeing to participate in our Mobile Shopping study. This is what mobile shopping means. Imagine that on your visit to the store you select all the items you would like to purchase. You take your shopping cart to an employee who scans all items you put into your shopping cart. The picture (right) illustrates the mobile scanning process.

Once you have completed shopping, you take your shopping cart to the checkout area. The checkout area is equipped with mobile payment terminals that can access the information stored on the employee's mobile scanning device. To check out, you swipe your mobile phone over the terminal and authorize the payment on your mobile phone. The picture (right) illustrates the mobile payment process.



Mobile Assisted Scanning and Fixed Self-service Payment

Thank you for agreeing to participate in our Mobile Shopping study. This is what mobile shopping means. Imagine that on your visit to the store you select all the items you would like to purchase. You take your shopping cart to an employee who scans all items you put into your shopping cart. The picture (right) illustrates the mobile scanning process.

Once you have completed shopping, you take your shopping cart to the checkout area. The checkout area is equipped with self-service terminals that are capable of accessing the information stored on the employee's mobile scanning device. You will then use your credit/ card or cash to complete the shopping experience. The picture (right) illustrates the payment process.



Mobile Assisted Scanning and Mobile Assisted Payment

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Once you have completed shopping, you take your shopping cart to any sales representative in the store. The sales representative is equipped with a mobile payment terminal that is capable of accessing the information stored on the employee's mobile scanning device. The sales person swipes your credit card over the mobile payment terminal and asks you to authorize the payment. The picture (right) illustrates the payment process.



Mobile Assisted Scanning and Fixed Automated Payment

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Once you have completed shopping, you take your shopping cart to the checkout area. The checkout area includes smartgates that are capable of accessing the information stored on the employee's mobile scanning device. If you are a registered customer with the store, your credit card will be automatically billed. Below is a picture illustrating what a smartgate looks like.



Mobile Assisted Scanning and Fixed Assisted Payment

Thank you for agreeing to participate in our Mobile Shopping study. This is what mobile shopping means. Imagine that on your visit to the store you select all the items you would like to purchase. You take your shopping cart to an employee who scans all items you put into your shopping cart. The picture (right) illustrates the mobile scanning process.

Once you have completed shopping, you take your shopping cart to the checkout area. The checkout area has assisted checkouts including cashiers who will help you checking out your products. The assisted checkout process involves a scanner that is capable of accessing the information stored on the employee's mobile scanning device. Next, the cashier assists you with your payment and asks you if you would like to pay cash, debit or via credit card. The picture (right) illustrates the process.



Mobile Automated Scanning and Mobile Self-service Payment (NFC)

Thank you for agreeing to participate in our Mobile Shopping study. This is what mobile shopping means. Imagine that on your visit to the store, you have a smart shopping cart equipped with a screen that displays the products you have put into your shopping cart. The system also displays the total amount (in dollars) that you have in your smart cart and provides some basic product information. The pictures (right) illustrate smart carts.

Once you have completed shopping, you take your smart cart to the checkout area. The checkout area is equipped with mobile payment terminals that are capable of accessing the information stored on your smart cart. To check out, you swipe your mobile phone over the terminal and authorize the payment on your mobile phone. The picture (right) illustrates the mobile payment process.



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Once you have completed shopping, you take your smart cart to any sales representative in the store. The sales representative is equipped with a mobile payment terminal that is capable of accessing the information stored on your smart cart. The sales person swipes your credit card over the mobile payment terminal and asks you to authorize the payment. The picture (right) illustrates the payment process.



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Once you have completed shopping, you take your shopping cart to the checkout area. The checkout area has assisted checkouts including cashiers who will help you checking out your products. The assisted checkout has a smart cart reader that allows the cashier to instantly identify all products you have put into your smart cart. Next, the cashier assists with your payment and asks you if you would like to pay cash, debit or via credit card. The picture (right) illustrates the process.



Mobile Self-service Scanning (store device) and Mobile Self-service Payment (NFC)

Thank you for agreeing to participate in our Mobile Shopping study. This is what mobile shopping means. Imagine that on your visit to the store you select the products and scan them using a mobile scanning device. Once you have completed shopping, you take your shopping cart to the checkout area that is equipped with mobile payment terminals. To complete the checkout, you swipe your mobile phone over the terminal and authorize the payment on your mobile phone. The pictures (right) illustrate the process.



Mobile Self-service Scanning (store device) and Fixed Self-service Payment

Thank you for agreeing to participate in our Mobile Shopping study. This is what mobile shopping means. Imagine that on your visit to the store you select the products and scan them using a mobile scanning device. Once you have completed shopping, you take your shopping cart to the checkout area that is equipped with self-service payment terminals that can read the information stored on your mobile scanning device. You will then use your credit/card or cash to complete the shopping experience. The pictures (right) illustrate the payment process.



Mobile Self-service Scanning (store device) and Mobile Assisted Payment

Thank you for agreeing to participate in our Mobile Shopping study. This is what mobile shopping means. Imagine that on your visit to the store you select the products and scan them using a mobile scanning device. Once you have completed shopping, you take your mobile scanning device to any sales representative in the store. The sales representative is equipped with a mobile payment terminal that is capable of accessing the information stored on your mobile scanning device. The sales person swipes your credit card over the mobile payment terminal and asks you to authorize the payment. The pictures (right) illustrate the payment process.



Mobile Self-service Scanning (store device) and Fixed Automated Payment

Thank you for agreeing to participate in our Mobile Shopping study. This is what mobile shopping means. Imagine that on your visit to the store you select the products and scan them using a mobile scanning device. The picture (right) illustrates the process.

Once you have completed shopping, you take your shopping cart to the checkout area. The checkout area includes smartgates that are capable of accessing the information stored on the mobile scanning device. If you are a registered customer with the store, your credit card will be automatically billed. Below is a picture illustrating what a smartgate looks like.



Mobile Self-service Scanning (store device) and Fixed Assisted Payment

Thank you for agreeing to participate in our Mobile Shopping study. This is what mobile shopping means. Imagine that on your visit to the store you select the products and scan them using a mobile scanning device. The picture (right) illustrates the process.

Once you have completed shopping, you take your shopping cart to the checkout area. The checkout area has assisted checkouts including cashiers who will help you checking out your products. The assisted checkout has a scanner that allows the cashier to instantly identify all products you have scanned using your mobile scanning device. Next, the cashier assists you with your payment and asks you if you would like to pay cash, debit or via credit card. The picture (right) illustrates the process.



Mobile Self-service Scanning (mobile phone) and Mobile Self-service Payment (NFC)

Thank you for agreeing to participate in our Mobile Shopping study. This is what mobile shopping means. Imagine that on your visit to the store you use your mobile phone to scan all the products you would like to purchase. Your mobile phone shows the total for all products you put into your shopping cart. Once you have completed shopping, you take your shopping cart to the checkout area that is equipped with mobile payment terminals. To complete the checkout, you swipe your mobile phone over the terminal and authorize the payment on your mobile phone. The pictures (right) illustrate the process.



Mobile Self-service Scanning (mobile phone) and Fixed Self-service Payment

Thank you for agreeing to participate in our Mobile Shopping study. This is what mobile shopping means. Imagine that on your visit to the store you use your mobile phone to scan all the products you would like to purchase. Your mobile phone shows the total for all products you put into your shopping cart. Once you have completed shopping, you take your shopping cart to the checkout area. The checkout area is equipped with self-service terminals that are capable of accessing the information stored on your mobile phone. You will then use your credit/card or cash to complete the shopping experience. The pictures (right) illustrate the process.



Mobile Self-service Scanning (mobile phone) and Mobile Assisted Payment

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Mobile Self-service Scanning (mobile phone) and Fixed Automated Payment

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Mobile Self-service Scanning (mobile phone) and Mobile Self-service Payment (mobile phone)

Thank you for agreeing to participate in our Mobile Shopping study. This is what mobile shopping means. Imagine that on your visit to the store you use your mobile phone to scan all the products you would like to purchase. Your mobile phone shows the total for all products you put into your shopping cart. Once you have completed shopping, you can also pay on your phone either through a stored credit card or through a third party payment service. You will receive an e-receipt instantaneously on your phone. The picture (right) illustrates the scanning and payment process.



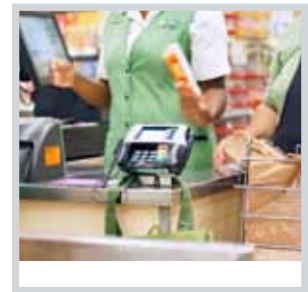
Fixed Assisted Scanning and Mobile Self-service Payment (NFC)

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Mobile Automated Scanning and Fixed Automated Payment

Thank you for agreeing to participate in our Mobile Shopping study. This is what mobile shopping means. Imagine that on your visit to the store you select the products as you normally do. Once you have completed shopping, you take your shopping cart to the checkout area. The checkout area is equipped with self-service terminals. In order to checkout, you scan your items and take your shopping cart to the checkout area that is equipped with smart readers. If you are a registered customer with the store, your credit card will be automatically billed. The pictures (right) illustrate the process.



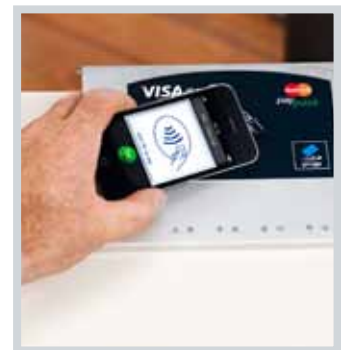
Mobile Point-of-Sale and Loss Prevention: An Assessment of Risk Appendix 2

“I THINK EQUIPPING MOST PRODUCTS WITH RFID TAGS THAT ARE CROSS REFERENCED WITH YOUR DIGITAL RECEIPT ON YOUR PHONE WOULD MAKE THE EXIT CHECKS A LOT QUICKER AND LESS INVASIVE TO MOST PEOPLE. I GATHER THAT STORES THINK EXIT CHECKS ARE THE WAY TO GO WITH DETERRING THEFT, ESPECIALLY IF MOBILE CHECK OUT IS INTRODUCED. HOWEVER, I GREATLY VALUE MY PRIVACY (AND MY TIME) AND ALSO FIND SUCH CHECKS VERY INSULTING IN GENERAL. THE MAJORITY OF PEOPLE ARE HONEST ENOUGH TO PAY FOR ITEMS FROM STORES. THEY ALSO DON’T NEED THEIR TIME WASTED WITH CHECKING THROUGH BAGS AND RECEIPTS. ANY ESTABLISHMENT THAT INSTITUTED SUCH A POLICY WOULD AUTOMATICALLY LOSE MY BUSINESS PERMANENTLY.” **Customer (male, 20-29)**

“I WOULD BE INTERESTED IN ANYTHING THAT MAKES SHOPPING MORE CONVENIENT, TIME-EFFICIENT, OR CHEAPER (EASIER TO USE COUPONS). IF THE TOTAL TIME OF CHECKING MYSELF OUT WITH A SMARTPHONE PLUS BEING CHECKED AT THE EXIT OF THE STORE TOOK LESS TIME THAN A TRADITIONAL CHECKOUT LINE (OR ESPECIALLY, IF IT WERE CHEAPER), I WOULD NOT MIND. I ALSO APPROVE OF INTRODUCING THIS AS AN OPTION, WHILE ALLOWING PEOPLE TO CHOOSE WHICH WAY THEY WOULD PREFER TO CHECK OUT. I WOULD BE CONCERNED WITH PEOPLE USING MY ACCOUNT INFO, BUT NOT IF FRAUD COULD EASILY BE DETECTED BY LOCATION, OR IF RECEIPTS WERE SENT TO MY EMAIL AUTOMATICALLY (I WOULD BE LIKELY TO NOTICE ANY UNUSUAL ACTIVITY MYSELF).” **Customer (female, 20-29)**

“WHEN I’VE BEEN IN STORES USING MOBILE CHECKOUT, THE SOLUTIONS USED BY EMPLOYEES TO SCAN THE GOODS AND MAKE PAYMENTS ARE ALWAYS MUCH SLOWER THAN A TRADITIONAL CHECKOUT COUNTER---OR IT FEELS THAT WAY, ANYWAYS. WHILE I THINK THAT MOBILE SHOPPING IS AN INTERESTING CONCEPT, I HAVE TWO BIG ISSUES WITH THE IDEA: (1) ANYWHERE WITHOUT ANY KIND OF COMPETITION (YOU MUST USE THE STORE’S SPECIFIC SOFTWARE, ETC.), THERE IS A VERY HIGH CHANCE OF BUGGY/SLOW INTERFACE THAT WILL LEAD TO FRUSTRATION AND MOST LIKELY TAKE LONGER THAN SIMPLY USING A CHECKOUT STAND AS USUAL. (2) FOR THOSE OF US WITH SOCIAL ANXIETY, IT CAN BE MUCH MORE DAUNTING TO SEARCH AND FIND AN EMPLOYEE TO CORRECT AN ERROR/BUG WITH THE SOFTWARE, AND THEN DEAL WITH THE HUMILIATING CONCEPT OF EXIT CHECKS THAN TO SIMPLY USE THE CHECKOUT STAND.” **Customer (male, 20-29)**

Customer Quotes: **Risks** Technology Perspective



Mobile Point-of-Sale and Loss Prevention: An Assessment of Risk Appendix 2

“MOBILE SHOPPING IS GREAT IN MOST REGARDS (BASED BOTH ON PRINCIPLE AND MY EXPERIENCE), BUT THERE ARE SEVERAL PROBLEMS: (1) FEWER JOB OPPORTUNITIES. I BELIEVE IN FORWARD PROGRESS, BUT AMERICA NEEDS TO DEVELOP JOB SECURITY INSTEAD OF OUTSOURCING JOBS OVERSEAS OR IN THIS CASE, TO NEW TECHNOLOGY THAT ENTIRELY REPLACES HUMANS. (2) THERE DEFINITELY IS A SECURITY PROBLEM TO ADDRESS. I THINK THE REGISTERING IDEA IS THE BEST MAIN IDEA TO ADOPT, BUT ADDITIONALLY, HAVING AN EMPLOYEE MONITOR A SET NUMBER OF MOBILE CHECKOUTS (LIKE I’VE SEEN IN BI-LO, WAL-MART, AND SOME OTHER STORES; THEY HAVE A CENTRALIZED STATION THAT OVERSEES FOUR CHECKOUTS AND CAN ASSIST A CUSTOMER IF A PROBLEM ARISES) WOULD LIKELY DETER SHOPLIFTING, AS WELL AS RETAIN SOME JOB POSITIONS. (3) THE CONCEPT OF CHECKING OUT ON YOUR SMARTPHONE, OR FROM A SIMILAR SET-UP WITH A ROAMING EMPLOYEE SOUNDS NICE, BUT I DON’T SEE HOW THAT COULD BE DONE IN A SECURE WAY IF DONE BY THE INDIVIDUAL, OR TIMELY IF SEARCHING FOR THE EMPLOYEE.”

Customer (male, 20-29)

“I WORK IN RETAIL, AND MY STORE HAS STOPPED CHECKING CARTS AS THEY PASS THROUGH THE DOORS. WE HAD OUR INVENTORY LAST MONTH. WE WERE HALF A MILLION DOLLARS SHORT. SO YES, I STRONGLY FEEL THAT CARTS SHOULD BE CHECKED. IF THEY’RE NOT, THE PRICES IN THE STORE GO UP AS THE STORE LOSES MORE MONEY. IT’S BETTER FOR EVERYONE IF WE TAKE ANY STEPS NECESSARY TO PREVENT LOSS.” **Customer (female, 20-29)**

“I REALLY HOPE THIS TYPE OF MOBILE SHOPPING IS NOT IMPLEMENTED IN ALL STORES AS THE ONLY WAY OF CHECKING OUT. I MUCH PREFER BEING RUNG UP AT CHECKOUT BY AN EMPLOYEE OF THE STORE.” **Customer (female, 20-29)**

Customer Quotes: **Risks Employee Perspective**



Mobile Point-of-Sale and Loss Prevention: An Assessment of Risk Appendix 2

"I THINK ITS SILLY THAT YOU EVEN HAVE TO CONSIDER THAT PEOPLE WOULD BE ANNOYED WITH EXIT CHECKS. IF THEY WERE NOT VERIFYING PEOPLES PURCHASES WITH THE MOBILE CHECK OUT THEN PEOPLE MIGHT STEAL MORE WHICH WOULD CAUSE THE STORE TO RAISE PRICES. IT SEEMS LIKE A SMALL THING TO HAVE YOUR CART CHECKED IN ORDER TO PREVENT LOSS TO THE STORE." **Customer (female, 30-39)**

"I DON'T MIND RANDOM CHECKS GOING OUT THE DOOR BUT IF IT HAPPENED EVERY TIME I WOULD DEFINITELY NOT USE THAT STORE DUE TO THE TIME AND INCONVENIENCE." **Customer (female, 50-59)**

"I WOULD INSTANTLY STOP USING ANY STORE THAT HAD EXIT INSPECTIONS ANYWHERE. IF MOBILE SHOPPING BECOMES A THING, I WOULD 100% RATHER JUST ONLINE SHOP FOR GROCERIES." **Customer (female, 20-29)**

"IT IS IMPORTANT TO HAVE A PLEASANT ATMOSPHERE THAT DOES NOT MAKE CUSTOMERS FEEL UNCOMFORTABLE. I WOULD RESENT THE IMPLICIT ASSUMPTION THAT I AM UNTRUSTWORTHY AND WOULD NOT SHOP AT THAT STORE AGAIN." **Customer (female, 20-29)**

"SOME RETAILERS CHECK EVERYONE AS THEY EXIT THEIR STORES. IF DONE PROPERLY THE EXIT CHECK COULD ADD TO THE SHOPPING EXPERIENCE IF THE STORE EMPLOYEE ASKS QUESTIONS LIKE 'DID YOU FIND EVERYTHING?'" **Customer (male, 40-49)**

Customer Quotes: **Risks** Retailer/Store Perspective



Mobile Point-of-Sale and Loss Prevention: An Assessment of Risk

Appendix 2

“IF IT TOOK ME LONGER TO GET THROUGH THE STORE USING MOBILE SHOPPING, I WOULD BE LESS LIKELY TO USE IT.” **Customer (female, 40-49)**

“I THINK SHOPLIFTING WILL HAPPEN AT A CONSISTENT RATE, REGARDLESS OF HOW MUCH SURVEILLANCE A STORE HAS (BE IT CAMERAS, CART-EXAMINING ON EXIT, ETC). I FEEL LIKE ALL ATTEMPTS TO PREVENT SHOPLIFTING DON’T ACTUALLY AFFECT SHOPLIFTERS, JUST REGULAR SHOPPERS. THE BEST EXAMPLE OF THIS IS SELF-CHECKOUT WHERE ITEMS ARE WEIGHED. I’VE NEVER SHOPLIFTED, BUT SELF-CHECKOUT SYSTEMS SEEM TO THINK THAT MY ITEMS ARE EITHER TOO HEAVY OR TOO LIGHT, SO I ALWAYS END UP NEEDING A STORE EMPLOYEE TO CHECK ME OUT ANYWAYS. I HATE THIS, BECAUSE SELF-CHECKOUT IS MEANT TO SAVE TIME WHEN REGULAR CHECKOUT LINES ARE TOO LONG!”

Customer (male, 20-29)

“I THINK SHOP LIFTING IS SO MINOR OF AN ISSUE THAT IT IS ALMOST A NON-ISSUE. SHRINKAGE WILL ALWAYS HAPPEN BECAUSE SOME PEOPLE WILL ALWAYS TRY TO FIND A WAY TO NOT PAY. MOST PEOPLE HOWEVER DO NOT GO SHOPPING UNLESS THEY ARE CAPABLE AND WILLING TO BUY WHAT THEY WENT SHOPPING FOR. I THINK THE NOTION THAT CUSTOMERS WILL STEAL IF THEY THINK THEY CAN GET AWAY WITH IT, IS INSULTING. IF PEOPLE STEAL THEN IT IS ALMOST ALWAYS AN ISOLATED INCIDENT AND IN MY EXPERIENCE IT WAS ALMOST NEVER SUBTLE. THE THIEF SIMPLY GRABBED WHAT THEY WANTED AND LEFT BECAUSE THEY KNEW THAT THEY WOULDN’T GET CHASED AND THE POLICE WOULD ARRIVE LATE. BUT IF SUCH PEOPLE MAKE UP 1/10000 CUSTOMERS THEN THEIR IMPACT ON THE BOTTOM LINE NEGLIGIBLE.”

Customer (male, 30-39)

“EXIT INSPECTIONS WOULDN’T BE NECESSARY IF THE EXITS WERE EQUIPPED WITH THE SENSORS ALLUDED TO AT THE BEGINNING OF THE SURVEY. IF THERE WAS A ‘SMART CART’ CAPABLE OF CATALOGING THEIR CONTENTS AND COMING UP WITH A TOTAL VALUE, THEN EMPLOYEE OR SELF SCANNERS WOULD BE UNNECESSARY. ALL ONE WOULD HAVE TO DO IS WALK THEIR CART THROUGH THE SENSOR AND THE AMOUNT WOULD BE CHARGED. IT WOULDN’T MATTER IF SOMEONE GRABBED AN ITEM WITHOUT THE INTENTION OF PAYING FOR IT IF THE CHARGE IS AUTOMATIC AS SOON AS THEY STEP THROUGH THE EXIT. A SYSTEM LIKE THIS WOULD MOST LIKELY REQUIRE INDIVIDUAL ACCOUNTS FOR THE CUSTOMERS AND THE ADDED COST OF MAKING EACH ITEM DETECTABLE

Customer Quotes: Risks Customer Perspective



Mobile Point-of-Sale and Loss Prevention: An Assessment of Risk Appendix 2

BY THE SENSORS, BUT WOULD ELIMINATE THE POSSIBILITY OF SHOP LIFTING WITHOUT INTRUDING UPON THE CUSTOMERS' SHOPPING EXPERIENCE."

Customer (female, 20-29)

"I THINK A LARGE AMOUNT OF SHOPLIFTING INVOLVES EMPLOYEES. EXIT CHECKS ARE LARGELY WINDOW DRESSING, AND INCONVENIENCE ME. I DON'T THINK THEY PREVENT THEFT." **Customer (female, 40-49)**

"MOBILE SHOPPING SHOULD BE ABLE TO TRACK WHICH ITEMS ARE IN THE CART IN THE SAME WAY SELF CHECKOUT DOES (USING RFID OR SOMETHING SIMILAR). THERE'S NO NEED TO HARASS CUSTOMERS AS THEY LEAVE THE STORE. THE PARANOIA ABOUT SHOPLIFTING AND EXIT CHECKS IN THIS SURVEY IS DISCONCERTING AND I WOULD NOT LIKE TO SHOP AT A STORE WITH THIS LEVEL OF DISRESPECT FOR THE CONSUMER. INTEGRATING MAPS INTO MOBILE DEVICES WOULD MAKE SHOPPING IN LARGE STORES FASTER AND MORE ENJOYABLE." **Customer (male, 30-39)**

Customer Quotes: **Risks** Customer Perspective



About the Organizations

Sam M. Walton College of Business

The Sam M. Walton College of Business is a nationally and internationally recognized leader in business education and research. Since its founding at the University of Arkansas in 1926, the Walton College has grown to become the state's premier college of business – as well as a nationally competitive business school. The college encourages research and creation of the latest business knowledge. Its research and outreach centers provide a link to and serve the needs of the business community and the state.



Retail Industry Leaders Association

RILA is the trade association of the world's largest and most innovative retail companies. RILA members include more than 200 retailers, product manufacturers, and service suppliers, which together account for more than \$1.5 trillion in annual sales, millions of American jobs and more than 100,000 stores, manufacturing facilities and distribution centers domestically and abroad.



About Checkpoint Systems, Inc. (www.checkpointsystems.com)

Checkpoint Systems is a global leader in merchandise availability solutions for the retail industry, encompassing loss prevention and merchandise visibility. Checkpoint provides end-to-end solutions enabling retailers to achieve accurate real-time inventory, accelerate the replenishment cycle, prevent out-of-stocks and reduce theft, thus improving merchandise availability and the shopper's experience. Checkpoint's solutions are built upon 45 years of radio frequency technology expertise, innovative high-theft and loss-prevention solutions, market-leading RFID hardware, software, and comprehensive labeling capabilities, to brand, secure and track merchandise from source to shelf. Checkpoint's customers benefit from increased sales and profits by implementing merchandise availability solutions, to ensure the right merchandise is available at the right place and time when consumers are ready to buy. Listed on the NYSE (NYSE: CKP), Checkpoint operates in every major geographic market and employs 4700 people worldwide.

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