

Smart device, smart pay

Taking mobile
payments from coffee
shops to retail stores



Deloitte's mPayments practice brings together capabilities from across Deloitte's businesses including its Technology, Media, and Telecommunications practice, its Financial Services practice, its Retail practice, and a host of other business functions in its strategy and technology groups. Deloitte's work in the mPayments space includes strategy, design, and implementation of a wide variety of mPayment capabilities. The Payments Center of Excellence can draw on the support of over 7,700 practitioners with specific industry and functional capabilities.

About the authors

Dr. Preeta M. Banerjee is a senior manager in Deloitte Services LP and heads cross-sector technology, media, and telecommunications research.

Craig Wigginton, Deloitte & Touche LLP, leads the organization's telecommunications industry practice in the United States, globally, and for the Americas.

Contents

Mobile payments: The wave of the future?		1
The mPay-at-POS ecosystem		3
Drivers and barriers to adoption		5
Tipping the scales toward mPay-at-POS solutions		11
Shaping the future payments landscape		16
Endnotes		18
Contacts		22
Acknowledgements		22

Mobile payments: The wave of the future?

Howard is a tech-savvy professional who uses his smartphone at least 50 times a day. He starts his day using his favorite coffee shop chain's mobile payment app, which allows him to pre-order his favorite latte, earn and redeem loyalty points, and self-checkout by paying at the counter with his phone. He wishes he had a similar app for his favorite retail store to facilitate larger purchases that take more effort and time.

Rick, the owner of a major retail store chain, has a related problem at the other end of the POS transaction. He knows that retailers are being asked to upgrade their POS terminals to better protect the customer's financial information. However, customer surveys indicate there is no single standard solution, and deploying multiple solutions will be complex and expensive.

Howard upgrades his smartphone and discovers a new "Smart Pay" app integrated in his mobile device. He adds his credit, utility, and loyalty cards to the mobile wallet application by clicking their pictures, thus avoiding the hassle of typing details. As Howard goes to shop at Rick's store, Howard's mobile virtual assistant, which is integrated with Smart Pay, asks his permission to link to the store's sensors. With permission granted, the app then automatically links to that store's branded credit option. The virtual assistant also notifies Howard about his stored loyalty points from past purchases and the personalized offers available for him at the store. While searching for an item he plans to buy, Howard receives an email coupon offering him a 5 percent discount on that item, as well as 10 percent off on cross-sells and upsells. As Howard adds products to his shopping cart, he uses his phone to scan their bar codes into a digital shopping cart. When he is done shopping, Howard simply puts his thumb on the biometric identifier and waves his smartphone—with its digital shopping cart now full of items—at the new point-of-service checkout terminal. Within seconds, Howard receives an e-bill with his updated loyalty points and discounts on future purchases. While a sales associate removes security tags and bags his items, Howard reflects on the streamlined in-store shopping experience he has just had. Behind the scenes, Rick also benefits from the revamped transaction process: It allows him to place highly valued employees at key locations in his store and gain customer trust, loyalty, and insights for bettering his retail presence for the future.

Traditional e-commerce and digital wallet companies—as well as mobile device manufacturers—are actively investing in developing a point-of-sale (POS) physical presence in retail stores to capture the growth in mobile payments (mPayments) at POS terminals—a payment system we refer to throughout this report as “mPay-at-POS.” However, to date, most of the successful examples of mPay-at-POS have been in convenience end markets with small average order values (AOV),¹ such as coffee shops and fast food chains,² and typically involve closed-loop or prepaid arrangements.³ mPay-at-POS’s relative lack of adoption at venues with higher-AOV transactions, such as retail stores,⁴ presents both a challenge and

a significant market opportunity for mPay-at-POS ecosystem players.

One likely key to unlocking the potential of mPay-at-POS for higher-AOV transactions is to combine the benefits of brick-and-mortar retail with advances in smart devices to deliver smart pay solutions. In this article, we explore factors driving the development of mPay-at-POS solutions as well as barriers to their broader adoption. We offer six strategies for CEOs, CFOs, and product management and R&D heads at technology and telecom solution providers in the mPay-at-POS ecosystem that can help them pursue breakthrough growth in mPay-at-POS brick-and-mortar retail stores.

The mPay-at-POS ecosystem

IN the United States, mPayments are burgeoning as a valid alternative to cash, checks, and credit and debit card transactions.⁵ As mobile technologies proliferate—powered by the complementary technologies of cloud, analytics, and social—mPayments are expected to grow further, driven by a combination of government support,⁶ increased smartphone and application usage,⁷ and the promise of a better shopping experience.⁸

mPay-at-POS is one specific form of mPayment that allows customers to make payments in a store in much the same way as they would

make a standard credit card transaction.⁹ This type of payment represents the fastest growing segment in mPayments, with transaction values expected to grow 34X from 2014 levels to reach \$118 billion in 2018.¹⁰ mPay-at-POS transactions have two defining features. First, they include a system that uses contactless technologies (figure 1) for making secure payments through a smart device at a POS terminal.¹¹ And second, they leverage the intrinsic features of the user's smart device to enable improvements in customer experience and retailer process.

Figure 1. Overview of competing mPay-at-POS technologies

Technology	Capabilities	Challenges
Near-field communications (NFC)	<ul style="list-style-type: none"> By 2018, will be enabled on >60 percent of smartphones Easy product integration 	<ul style="list-style-type: none"> Not available on all devices Needs an NFC-enabled POS terminal
Quick-response (QR) codes	<ul style="list-style-type: none"> Works on almost all OS and smart devices Leverages existing POS terminals 	<ul style="list-style-type: none"> Easily erasable and damageable Weak security
NFC with HCE (host card emulation)	<ul style="list-style-type: none"> No need to put card credentials on device Protects against device theft 	<ul style="list-style-type: none"> Card credentials on cloud Vulnerable to server breach
Bluetooth low energy (BLE)	<ul style="list-style-type: none"> Wide radius and coverage Real-time notifications to consumers 	<ul style="list-style-type: none"> Costly BLE beacon sensors Consumer notifications are passive
Magnetic secure transmission (MST)	<ul style="list-style-type: none"> Leverages existing POS terminals Broader acceptance 	<ul style="list-style-type: none"> Not available on all devices Security issues related with legacy magnetic stripe technology

Figure 2. mPay-at-POS ecosystem



Graphic: Deloitte University Press | DUPress.com

The landscape of mPay-at-POS solutions continues to evolve at a rapid pace.¹² The mPay-at-POS ecosystem features several categories of players: makers of retail and POS terminals, payment networks, payment processors, banks, end consumers, mobile wallet providers, device manufacturers, and providers of contactless payment technologies, as well as government and regulators (figure 2).

While analysts expect significant volume growth in mPay-at-POS,¹³ this ecosystem of

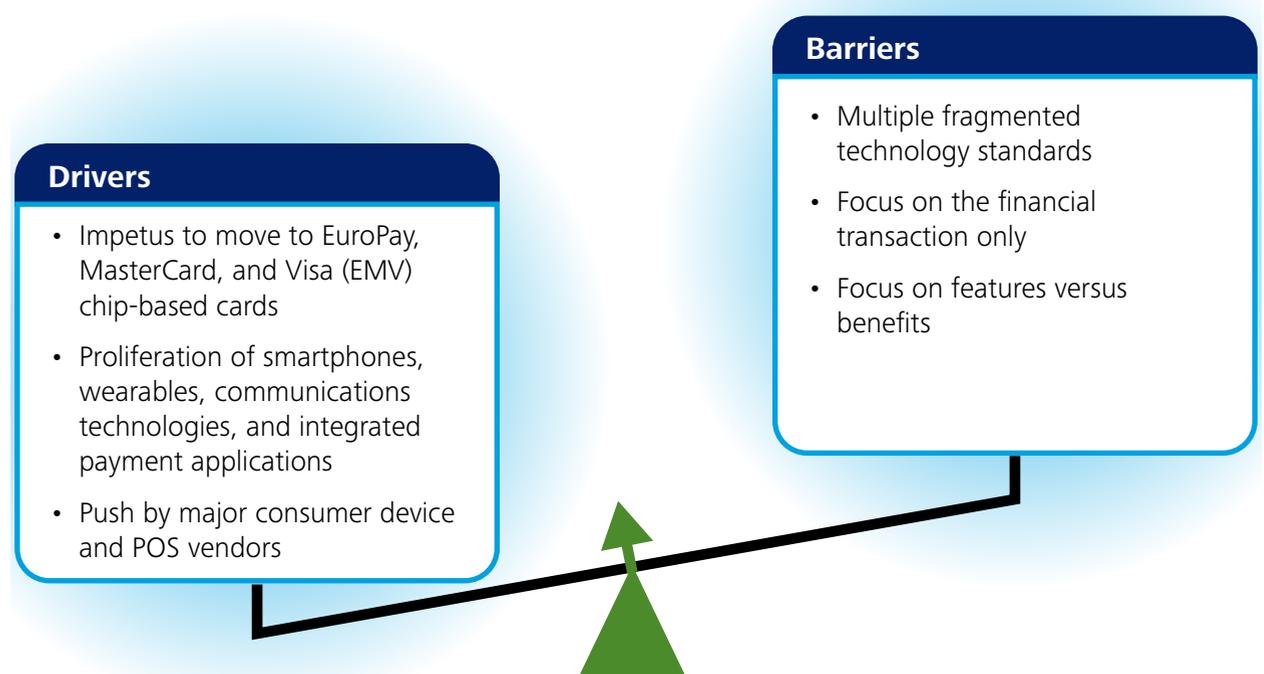
companies must capture higher-AOV transactions in order to thrive. For example, the AOV at major branded coffee shops and fast food chains was around \$3–\$8 per transaction. Meanwhile, for the major retailers it ranged between \$33 and \$99 per transaction.¹⁴ While the coffee shop's AOV leaves few absolute dollars for the ecosystem of companies to share in an mPay-at-POS transaction, the retailer's AOV represents a more lucrative transactional market for mPay-at-POS players.

Drivers and barriers to adoption

THE widespread use of smartphones and mobile apps, the pressures for efficiency on retailers, and consumers' demands for simplicity, choice, and security and privacy all play into the growing role of mPayments in our businesses, communities, and lives (figure 3). Yet, while these factors will likely drive

mPay-at-POS growth, several headwinds also stand in the way of mPay-at-POS's capturing higher-AOV transactions. Technology and telecom players in the mPay-at-POS ecosystem will need to address these limiting factors to unlock the full scale of the mPay-at-POS opportunity.

Figure 3. Tipping the scales in favor of mPay-at-POS



Drivers

Over the next decade, we foresee several market and regulatory forces accelerating the penetration and adoption of mPay-at-POS technologies, creating higher-AOV opportunities for mPay-at-POS solution providers and retailers alike. These drivers for mPay-at-POS market growth include:

The impetus to move to EuroPay, MasterCard, and Visa (EMV) chip-based cards.¹⁵ Regulatory changes to the financial payment infrastructure in the United States are a strong force propelling mPay-at-POS adoption. As of October 15, 2015, new payment network rules will shift liability for security breaches in financial transactions to players that do not support chip-based credit and debit cards.¹⁶ Retailers therefore have a regulatory as well as a security incentive to migrate to EMV chip-based cards. Recent security breaches and hacking incidents at prominent national retailers that have put consumer information and financial transactions at risk are a stark reminder of the danger of delaying conversion to EMV chip-based cards.¹⁷

While EMV migration may not directly impact mPay-at-POS, the combination of broader POS enablement and EMV chip-based cards may increase consumers' and retailers' willingness to broaden their use of mPay-at-POS transactions.¹⁸ Increased consumer trust and retailer confidence in EMV chip-based card security, coupled with investments in POS terminals and infrastructure, can enhance both the opportunities and scope for mPay-at-POS transactions.

The proliferation of smartphones, wearables, communications technologies, and integrated payment applications. Smartphone penetration in the United States has been fast and pervasive, reaching 58 percent in 2014 (up from 40 percent in 2012).¹⁹ The coming years are expected to see even greater penetration, with 90 percent of Americans expected to own smartphones by 2016.²⁰ Deloitte's 2014 Global Mobile Consumer Survey found that

consumers spent 69 percent more per month on applications in 2014 than in 2013, indicating broader use of downloadable applications as well as lower price awareness or sensitivity to in-application spending. Additionally, the increasing sophistication of wearables can give consumers the ability to sync more easily accessible wearable devices with smartphones to enable mPay-at-POS.²¹ The increasing ubiquity of smartphones, wearables, communications technologies, and integrated payment applications is reflected in findings that show that the next generation of consumers and workforce talent (those aged 18–34) will be increasingly smartphone-savvy and more willing to use mPay-at-POS than prior generations.²²

For mPay-at-POS transactions, smartphones must be equipped with integrated hardware and software to communicate with a range of POS terminals and payment applications. Here, too, advances are being made. Contactless payment technologies such as near-field communication (NFC) are increasingly being embedded in smartphones. NFC-enabled smartphone penetration is expected to rise to 64 percent worldwide by 2018.²³

A push by major consumer device vendors and POS terminal vendors. A push strategy on the part of some solution providers helped open the doors for mPay-at-POS in its initial years, when consumer uptake was low.²⁴ While this strategy may have been “putting the cart before the horse,” mPay-at-POS's adoption and promotion by some well-known consumer device vendors have helped consumers steadily gain confidence in this form of payment.²⁵ That said, mPay-at-POS still has ground to gain among consumers. Deloitte's Global Mobile Consumer Survey found that, while 29 percent of smartphone users expressed willingness to use mPay-at-POS, actual mPay-at-POS use was only 7 percent.²⁶ This gap indicates substantial untapped potential, but also that consumer adoption of mPay-at-POS depends on more than just the technology being available.

POS terminal providers are also bracing for the mPay-at-POS opportunity. Beyond equipping their terminals for EMV chip-based cards, these providers are also including NFC chips to enhance their products' value proposition. According to one estimate, more than half of all POS terminals in the United States will be EMV-enabled by the end of 2015; because most of the EMV terminals that have shipped since 2014 have been NFC-enabled, this means that a substantial proportion of US POS terminals are now or soon will be ready for NFC-based mPay-at-POS.²⁷

Barriers

Barriers to mPay-at-POS market growth include:

Multiple, fragmented technology standards. Our research on mPay-to-POS technologies²⁸ suggests that the multiplicity of standards for mPay-at-POS exists at three levels: the technology and communications infrastructure, the mobile wallet (predominantly based on applications or the smartphone hardware platform), and financial institutions' payment and settlement mechanisms.

- *Technology and communications incompatibility.* Following a period of technology platform experimentation, a plethora of mPay-at-POS technologies have emerged to offer competing solutions. These technologies include NFC, magnetic secure transmission (MST), QR code scanning, cloud-based technologies (including host card emulation [HCE]), and Bluetooth low energy (BLE)-based offerings (figure 1).²⁹ The diversity of options—rather than spurring market growth—seems to have introduced platform conflict. Absent a clear, widely adopted winning standard, retailers appear reluctant to invest in mPay-at-POS platforms due to concerns about return on investment and the cost of changing platforms if they make the “wrong” choice. Multiple standards are also giving rise to

consumer concerns due to incompatibilities in device and smartphone hardware, payment software applications, and retail POS infrastructure.³⁰

- *Lack of mobile wallet integration.* The extension of digital wallets to smartphones portends a transformation in financial transaction flexibility, consumer choice, and retail access. Many solution providers in the mPay-at-POS ecosystem are pursuing this opportunity, creating a variety of mobile wallet solutions without clear interconnections or interoperability. The span of offerings and applications varies among financial institutions, device manufacturers, and retailers, as well as mobile network providers. Moreover, mobile wallets differ in their functionality. Some work for in-app payments, while others work solely at the POS; some require prepaid arrangements, while others link with the user's bank account.³¹ The diversity and fragmentation of the mobile wallet space can create confusion for consumers and retailers alike.³² Beyond being confusing, the need to store credentials on multiple platforms makes the consumer more vulnerable to attacks from hackers and other fraudulent parties.³³ For these reasons, consumers will likely continue to be wary of entering their card information multiple times into separately owned and managed wallets.
- *Multiple payment and settlement mechanisms with financial institutions and payment processing companies.* mPay-at-POS solution providers face the challenge of choosing whether to leverage existing payment infrastructures (including bank and card networks and payment processors/systems) or disrupt existing systems via alternative solutions such as the Automated Clearing House (ACH).³⁴ Retailers explore such alternative solutions to avoid paying discount fees to card networks (typically from 2 to 5 percent).³⁵

A focus on the financial transaction only.

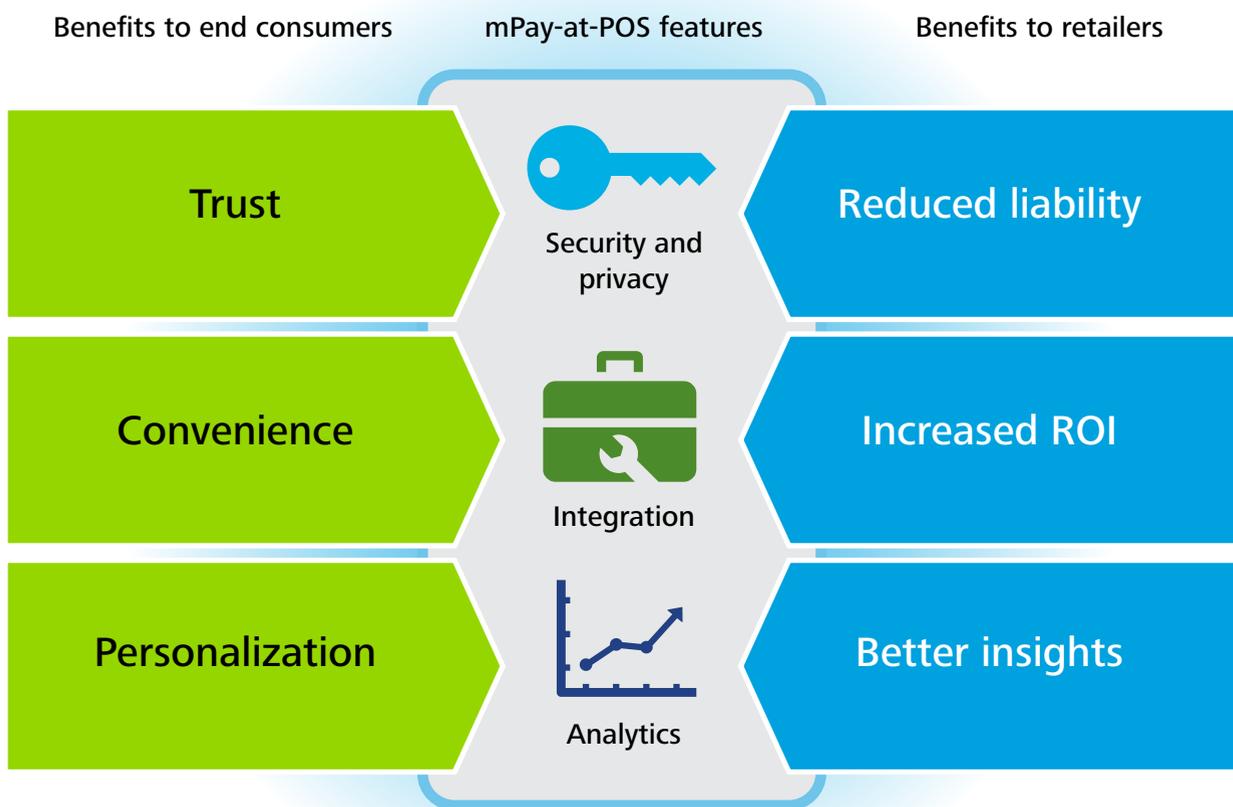
Early use cases of mPay-at-POS appear to have focused exclusively on completing the financial transaction, failing to capitalize on insights that could be gained from gathering information beyond the transaction data. Indeed, most mPay-at-POS solution providers build their sales pitches around the ability to execute transactions more quickly and cheaply.³⁶ But this singular focus on transaction speed and cost takes a limited view of mPay-at-POS’s potential value to retailers and consumers, emphasizing efficiency rather than productivity gains driven by enhanced awareness of consumers’ experiences, behaviors, and preferences.

As an alternative, mPay-at-POS providers could tout the opportunity to use mPay-at-POS systems to capture data beyond the transaction to gain insights into factors such

as consumer purchase preferences and behaviors. For retailers, capturing data beyond the transaction can help in areas such as supply chain integration, allowing them to better manage product selection, inventory, and in-store promotional activities. For consumers, extending mPay-at-POS’s data capture abilities could allow them, for instance, to use health and social data to inform mPay-at-POS transactions, enabling them to receive personalized offers and recommendations as part of a holistic shopping experience. Some solution providers have already started exploring this territory,³⁷ offering mPay-at-POS solutions that explore ways to rekindle the relationship between consumer and retailer beyond simply consummating a transaction.

mPay-at-POS providers could also more explicitly promote mPay-at-POS’s other potential benefits. For instance, reduced cash

Figure 4. Benefits of underlying mPay-at-POS features to consumers and retailers



handling can cut losses arising from fraud and theft,³⁸ while speeding the check-out process can lead to increased spending and more frequent purchases.

A focus on features versus benefits. Based on interviews with industry experts and findings from a number of surveys,³⁹ it appears that most mPay-at-POS approaches do not fully deliver the benefits and adoption requirements that consumers and retailers view as important. Primary features such as design, specifications, and form factors tend to garner more attention than the underlying benefits to end consumers and retailers. The relative lack of emphasis on mPay-at-POS's benefits represents a lost opportunity for mPay-at-POS solution providers to encourage adoption.

How can mPay-at-POS solution providers position their offerings in terms of benefits to both consumers and retailers? One challenge in doing this is that, on the surface, many of the benefits sought by end consumers and retailers appear to be misaligned or mutually exclusive. Yet digging deeper suggests that consumers and retailers share several important interests with respect to mPay-at-POS (figure 4), making it possible for mPay-at-POS providers to satisfy these interests—to deliver the benefits sought by both consumers and retailers—with a single underlying feature. Of these features, three of the most important are security and privacy, integration, and analytics—all of which can be promoted, not as ends in themselves, but as means to the end of an overarching benefit.

- *Security and privacy.* Security and privacy features such as encryption, biometrics, tokenization, and authentication—often emphasized in press releases and analyst reports on mPay-at-POS providers⁴⁰—offer parallel benefits to consumers and to retailers. For consumers, interviews and surveys suggest that the underlying benefit is trust.⁴¹ Trust, in fact, is essential in enticing consumers to first try and then adopt a new technology, especially when the technology

is linked to their monetary decisions and financial security.⁴² For their part, retailers gain the benefit of decreased liability for damages caused by breaches from security and privacy features. The risk of financial and reputational losses due to a security breach gives retailers ample incentive to seek to reduce their liability.⁴³

- *Integration.* Interviews and data reveal that, for retailers, return on investment (ROI) on technology deployment is crucial, as they are often squeezed on profitability.⁴⁴ As with any new technology that entails up-front investment and training needs, implementing mPay-at-POS solutions is expected to take considerable investment on the retailer's part.⁴⁵ Hence, mPay-at-POS solution providers need to crack the ROI code to encourage retailer adoption.⁴⁶ One way they can do so is to reduce retailers' costs and enhance their revenues through integration. For example, mPay-at-POS solution providers can help merchants process electronic payments through integration with banks and payment networks.⁴⁷ Additionally, by creating more upsell and cross-sell opportunities, mPay-at-POS can add to top-line growth.

On the other hand, consumer interviews and surveys suggest that consumers value convenience and ease of use, both of which are central to how rapidly they adopt and stick to a new solution.⁴⁸ To deliver these benefits to consumers, mPay-at-POS providers should strive to make disparate devices and applications work together seamlessly without compatibility issues.⁴⁹ One way to accomplish this is through application programming interfaces (APIs), which provide a platform for interlinking different applications across technological functionalities. (An example: Android Pay, which provides an API for in-app payments and can work on any Android device using Android KitKat 4.4 or above.)⁵⁰

- *Analytics.* Consumers today value personalization in the form of targeted offers and promotions.⁵¹ The migration from brick-and-mortar to online retail has transformed the level of personalization to which most consumers are accustomed, and even brick-and-mortar retailers are making efforts to personalize the shopping experience with a variety of proximity marketing strategies.⁵² Research by Deloitte indicates that almost half of all consumers are willing to share their purchase history—regardless of security concerns—if doing so would give them targeted advertisements, coupons, or product discounts.⁵³ As payment strategy consultant Jim Higgins points out, “The biggest value-add that mPay-at-POS solution providers can enable, from a customer point of view, is to take advantage of data

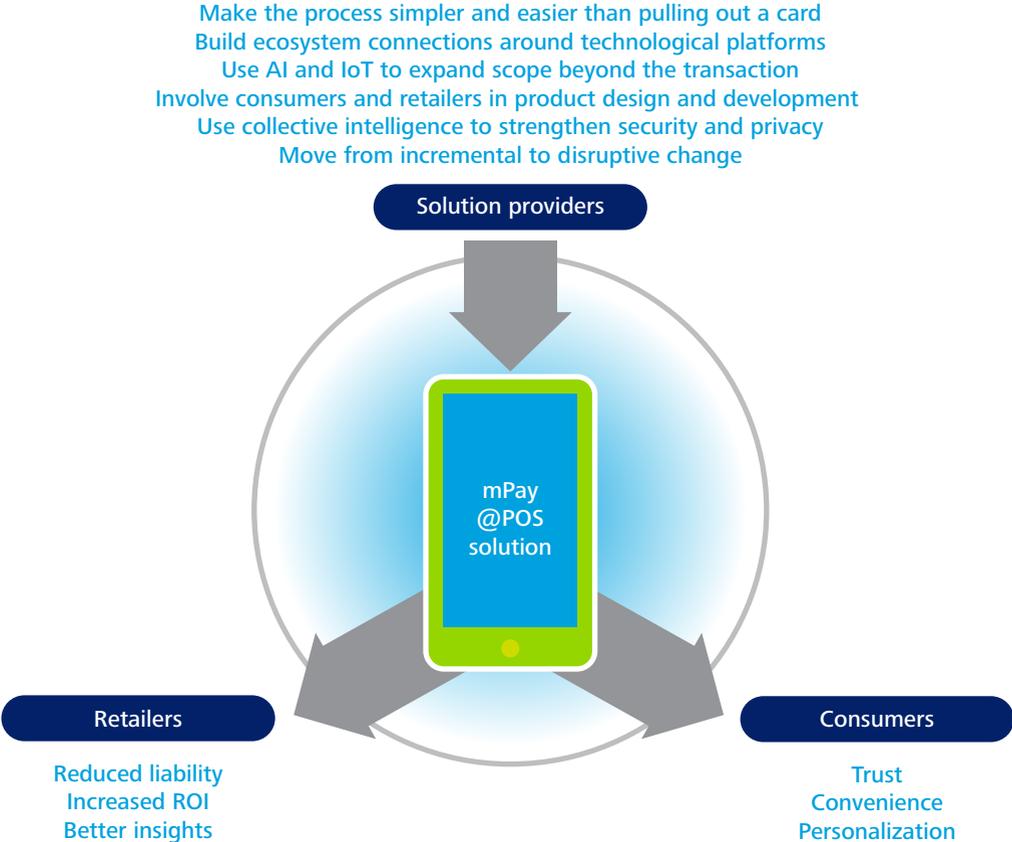
and provide [consumers with] features like targeted offers and loyalty points.”⁵⁴ mPay-at-POS solution providers can build and promote analytics features that enable retailers to deliver personalized experiences. Although most current mPay-at-POS solution providers have yet to successfully link stand-alone retail features to benefits like personalized pricing,⁵⁵ the opportunity to do so may help mPay-at-POS providers further encourage adoption by consumers. For retailers, meanwhile, analytics capabilities coupled with metadata collected before, during, and after a transaction can yield deeper consumer insights—a benefit that can help retailers more effectively determine product selection, brand assortment, store management, inventory, and in-store and off-store promotions.⁵⁶

Tipping the scales toward mPay-at-POS solutions

FOR mPay-at-POS to become common for higher-AOV transactions at brick-and-mortar retail stores, the drivers encouraging mPay-at-POS use need to outweigh the barriers to adoption. The following six strategies can

help CEOs, CFOs, and product/R&D management executives at technology and telecom companies address the barriers to adoption and tip the scales in favor of the drivers.

Figure 5. Six strategies to scale up mPay-at-POS adoption



1. Make the mPay-at-POS process simpler and easier than pulling out a card

The credit and debit card industry has set the standard for simplicity and convenience in the retail payments industry. For mPay-at-POS to gain mass adoption in retail, the ecosystem of mPay-at-POS technology and telecom carriers should develop solutions that are more convenient and no more complex for consumers than paying with a plastic card. The current plastic card transaction process is not without its drawbacks. Customers need to carry plastic cards, and they often carry multiple cards issued by independent retailers.⁵⁷ Consumers can be overwhelmed by the multiplicity of payment options: credit cards, debit cards, independent retailer cards, gift cards, loyalty and rewards programs, and so on.⁵⁸ Keeping track of all that plastic and having the right card for the right moment can be a challenge, and it can require a consumer to carry around a thick slab in his or her pocket or pocketbook.⁵⁹ mPay-at-POS may present a more elegant solution. In fact, technology solution providers could extend their mobile wallet applications to not only store all of a consumer's cards (credit, loyalty, and utility), but also encompass other wallet solutions by retailers⁶⁰ to create a mobile wallet of multiple digital currencies.

Additionally, consumers paying with cash or cards often have to wait in long checkout lines.⁶¹ If mPay-at-POS solution providers can focus on making the checkout process faster as well as easier than pulling out a plastic card, they can pave the way for mPay-at-POS's displacing today's standard payment model.

Even today, mPay-at-POS can offer consumers several convenience factors that may give it an edge over plastic cards. These convenience factors can include real-time couponing, cross- and upselling of related products, faster and more streamlined checkout, and automated billing. mPay-at-POS can also give

consumers the opportunity to integrate loyalty programs with a mobile wallet and enable faster redemption of incentives and discounts at the POS terminal, facilitated by APIs.

Furthermore, the convenience of mPay-at-POS will likely continue to improve as innovative devices and form factors, such as wearables, continue to be developed. As a recent example, Apple® has integrated its mPayments solution, the Apple Pay™ mobile payments solution, with its wearable Apple Watch™. Consumers can conveniently pay for purchases with the Apple Watch wearable device by double-clicking the button next to the digital crown and holding the face of the Apple Watch wearable device near the contactless POS reader.⁶² We believe that the integration of wearable technologies into everyday purchases will ratchet up mPay-at-POS acceptance due to superior convenience and lower price sensitivity.

2. Build ecosystem connections around technological platforms

Common technology platforms and standards are essential to increasing the interoperability and interconnectivity of the mPay-at-POS ecosystem. One way to drive standardization is to build ecosystem connections around specific technology platforms that are already in widespread use. One obvious platform to nucleate such connections are mobile operating systems, given their wide distribution and the fact that only a few operating system providers serve the entire smartphone market.⁶³ The growth in smartphone use—and the direct relationship between consumers and their smartphones' application stores—creates a captive consumer base that mobile operating system players can use to drive change. Therefore, mobile operating system providers are well-placed to drive alliances, partnerships, mergers and acquisitions, as well as other methods to make connections across other ecosystem participants, including banks, payment networks, developers, and retailers.

As an example, a large mobile operating system company recently announced the acquisition of an mPayments application previously owned by three major US mobile carriers, which the mobile operating system company recrafted and rebranded into a mobile wallet application. This mobile digital wallet application will soon come pre-installed on all smartphones sold by the three carriers that run on this specific operating system.⁶⁴

Given the up-front investment required for mPay-at-POS solutions, retailers require more certainty in the technological viability, stability, and ROI of mPayment solutions before deployment.⁶⁵ As mentioned above, mPay-at-POS providers can open up APIs to allow retailers to develop custom solutions and nucleate ecosystem connections. For example, WeChat—an instant messaging mobile app with a subscriber base of more than 350 million active users in China—opened its mobile payment API to verified retailers on the company’s WeChat mobile messaging app’s platform. Besides allowing in-app payments, retailers can also use WeChat for offline in-store payments through WeChat Pay’s QR code scanning feature.

3. Use artificial intelligence and the Internet of Things to expand scope beyond the purchase transaction

Through the Internet of Things (IoT), artificial intelligence (AI) applications can work in tandem with mobile wallets to keep the consumer abreast of a particular retailer’s offers and discounts. This can offer consumers a solution to the difficulty of keeping track of the loyalty cards in one’s wallet and help them get the most benefit out of their purchases. A virtual assistant, for example, could act as a bridge between the store app and a customer’s mobile wallet and inform him or her about available loyalty points and personalized offers. A virtual

assistant eliminates the need for the user to navigate through multiple menus to get what they need from an app. Instead, users would speak commands, and the right functionality would be delivered instantly. From the retailer’s perspective, a virtual assistant could also make it simpler for retailers to deliver personalized offers and upsell/cross-sell more products.

Sensors can further enhance mPay-at-POS solutions. With the consumer’s permission, a mobile wallet could auto-detect the sensors in a retailer’s network environment when the consumer enters a store, immediately syncing with the retailer’s network to activate proximity marketing and discounting, loyalty and rewards programs, and digital checkout, payment, and billing processes.⁶⁶

4. Involve consumers and retailers in product design and development

Capturing the voice of the customer during product design and development can help mPay-at-POS solution providers create solutions that consumers are likely to actually use. mPay-at-POS providers can gather consumer insights to inform product design as well as beta test product prototypes to gauge consumer reaction. It will be particularly important to engage younger consumers (ages 18–34), who are more smartphone-savvy and willing to use mPay-at-POS⁶⁷ than older consumers while simultaneously being more demanding of their applications and user experience. Engaging younger users up-front in solution design will pay dividends. For example, the developer of soon-to-be-launched Zapp Mobile Payments⁶⁸ believes that Millennials will be the earliest adopters of its mobile payment services. It has therefore included Millennials in product testing, building the user experience to suit Millennials’ needs.⁶⁹

It is also important to consider retailers' needs. While large retailers may be able to afford to upgrade their terminals to accommodate mPay-at-POS, small and medium businesses may not be able to invest a great deal of capital and effort to deploy mPay-at-POS solutions. Hence, mPay-at-POS solution providers can better reach the small- and medium-business market by developing products that are easy to use, inexpensive, and easily deployed. iZettle, a Sweden-based company, recently launched a card reader priced at \$120 that allows businesses to enable contactless payment systems, including the Apple Pay mobile payments solution. The reader is currently a small device that is plugged into a smartphone; going forward, further miniaturization will make it possible to integrate card readers into the smartphone itself. With such a smartphone, a transaction could become as simple as bringing two smart devices next to each other—the equivalent of a handshake—potentially sparking the development of “bring your own POS.”

5. Use collective intelligence to strengthen security and privacy

Consumers are more likely to purchase from companies that they believe protect their personal information.⁷⁰ For retailers, the cost of security breaches can be significant, especially in light of the imminent shift in liability to retailers for security around non-EMV POS systems. mPay-at-POS solution providers are well-positioned to address the dual challenge of security and EMV-compatibility.⁷¹ The magnitude of the potential losses to retailers due to fraud and security breaches—measured in billions of dollars for nationally branded retail chains—can far exceed the upgrade and subsequent running costs to enable mPay-at-POS.

mPay-at-POS solution providers should treat security as an ecosystem concern. They

should work with various ecosystem partners to combine multiple security and privacy solutions with the aim of giving consumers more choice over their information-sharing preferences, obtaining consumers' consent to disclose information, and being transparent in their use of consumer data. mPay-at-POS can also work with ecosystem participants to incorporate new technologies that can enhance security. “Tokenization” technology, for instance, allows transactions to take place without the direct use of sensitive consumer or financial information, instead associating every transaction with a digital token code.⁷² Tokenization reduces fraud risk such as counterfeiting, cloning, and skimming. Biometric authentication can create an additional layer of security by tying transaction approvals to individual features and physiological attributes that are very difficult to emulate.

Technology solution providers could benefit from early engagement with independent software vendors and security experts to design and prototype their solutions. For example, Apple partnered with Authorize.net to enable tokenization while acquiring AuthenTec for Touch ID™ fingerprint identity sensor (biometric authentication) to strengthen the security of its Apple Pay mobile payments solution.⁷³ Once the basic building blocks for authentication and encryption are created, solution providers can work closely with retailers, financial services firms, and security experts to share information and co-develop integrated security solutions for threat detection, intelligence, and advanced threat defense.

6. Move from incremental to disruptive change

In the United States, mPay-at-POS providers can continue to look at payment alternatives with an eye to replacing cards and not just the wallet. To accelerate the process, they

may be able to learn from the telecom industry's experience in emerging markets, where some telecom companies have successfully skipped a generation of technology and tradition⁷⁴ by bringing unbanked and underbanked customers into the payment ecosystem. This is relevant to providers in the United States because, according to a 2013 FDIC survey, close to 28 percent of households in the United States are unbanked or underbanked.⁷⁵ Mobile phone penetration, on the other hand, has

already crossed 90 percent in the United States, with smartphone penetration close behind.⁷⁶ Telecom players therefore have an opportunity to provide mobile financial services, including mobile payments, to the pool of underbanked and unbanked US smartphone owners. Targeting this market could allow millions to convert their mobile phone accounts into mobile banks and avail themselves of the benefits of mobile payments across a variety of situations.

Shaping the future payments landscape

ONGOING enhancements in technology, payment applications, and digital wallets that deliver convenience, security, and cost benefits to mPay-at-POS adopters can engender greater penetration and higher-AOV transactions for mPay-at-POS. The “cool” factor of mPay-at-POS is also likely to appeal to the next generation of consumers, for whom mPay-at-POS will be an established technology. But for

mPay-at-POS to progress further on the path toward ubiquity, mPay-at-POS solution providers will need to use the right levers to help address key factors that can favorably influence large-scale acceptance by both consumers and retailers. While mPay-at-POS may never completely replace traditional credit and debit cards, mPay-at-POS providers can take steps now to shape the future payments landscape.

STEPS FOR MPAY-AT-POS SOLUTION PROVIDERS TO CONSIDER

- *Make the mPay-at-POS process simpler and easier than pulling out a card.* Convenience, speed, and ease of use are key to driving consumer adoption.
- *Build ecosystem connections around technological platforms.* One way to drive standardization—and thus encourage mPay-at-POS adoption—is to take advantage of mobile operating systems as platforms around which to build alliances.
- *Use artificial intelligence and the Internet of Things to expand scope beyond the purchase transaction.* Virtual assistants and sensors could not only further simplify the mPay-at-POS transaction process, but deliver additional value in the form of greater personalization to consumers and deeper insights to retailers.
- *Involve consumers and retailers in product design and development.* Capturing the voice of the customer during product design and development can help mPay-at-POS solution providers create solutions that consumers are likely to actually use. Also important is to consider retailers’ needs.
- *Use collective intelligence to strengthen security and privacy.* Treat security as an ecosystem issue, and work with other ecosystem participants to develop and implement solutions such as tokenization and biometric identification.
- *Move from incremental to disruptive change.* Many unbanked or underbanked US consumers own smartphones, making this population an attractive target for mobile financial services, including mPay-at-POS solutions.

Methodology

The 2014 Global Mobile Consumer Survey (GMCS) was commissioned by Deloitte's global Technology, Media and Telecommunications (TMT) practice and fielded by an independent research firm in July 2014. All citations in this article refer to the US edition, which yielded 2,000 responses. Survey responses for the United States, were weighted to the US population (based on 2011 US census data). The survey offered insights into consumer habits, wants, and trends in the United States, with a focus on mobile devices and services. The survey included six age groups within the 18–74 age range.

Primary research for this article also included four external financial services and retail industry expert interviews conducted in August and September 2014, and select examples and illustrations developed from secondary sources. The financial services and retail executives interviewed, all had experience in payments and retail, including mobile payments, payment strategy formulation, mobile customer experience, and POS technology. The interviews covered five topics: the consumer value proposition of mPay-at-POS, security in proximity mobile payments, mPay-at-POS technologies, use of analytics in payments, and the role of technology and telecom solution providers in the mobile payments ecosystem. Additionally, we observed the formation of partnerships and alliances in the mPay-at-POS technology space during 2013–2014 among 12 leading mPay-at-POS solution providers and 100 vendors (technology players, card providers, POS terminal providers, and banks) involved in providing an mPay-at-POS solution.

Endnotes

1. Average order value = Total revenue/ Number of orders taken.
2. Let's Talk Payments, "15 food chains that are revolutionizing their payment methods," April 2014, <http://letstalkpayments.com/15-food-chains-that-arerevolutionizing-their-payment-methods-522469/>.
3. Closed-loop cards are single payee cards. They can be used only at a specific location or at the locations of a given payee. These cards are recharged with some amount in advance and the balance is subsequently used to pay for future purchases.
4. Deloitte, "2014 Global Mobile Consumer Survey: US Edition," January 2015, <http://www2.deloitte.com/us/en/pages/technology-media-and-telecommunications/articles/global-mobile-consumer-survey-us-edition.html>.
5. eMarketer, "Consumers bullish on a mobile payments future," October 9, 2014, <http://www.emarketer.com/Article/Consumers-Bullish-on-Mobile-Payments-Future/1011265>.
6. Andrea Peterson, "Apple Pay gets a big vote of confidence from the U.S. government," *Washington Post*, February 2015, <http://www.washingtonpost.com/blogs/the-switch/wp/2015/02/13/apple-pay-gets-a-big-vote-of-confidence-from-the-u-s-government/>.
7. Deloitte, "2014 Global Mobile Consumer Survey: US Edition."
8. Will Hernandez, "Mobile payments dominate the early holiday shopping season," *retailcustomerexperience.com*, December 2014, <http://www.retailcustomerexperience.com/articles/mobile-payments-dominate-the-early-holiday-shopping-season/>.
9. When we talk about mPay@POS, it is typically a "card present" transaction at the point of sale where the smartphone substitutes for the physical card. Card-present transactions typically carry a lower discount rate than card-not-present transactions, because of lower fraud risk.
10. eMarketer, "How popular are mobile in-store payments?," April 30, 2015, <http://www.emarketer.com/Article/How-Popular-Mobile-In-Store-Payments/1012422>.
11. Smart device: A smart device is an electronic device, generally connected to other devices or networks that can operate to some extent interactively and autonomously. Several notable types of smart devices are smartphones phablets and tablets, smartwatches, smart bands, and other smart wearables.
12. Dominic Basulto, "Why the mobile payments space is the most exciting space in tech right now," *Washington Post*, October 2014, <http://www.washingtonpost.com/blogs/innovations/wp/2014/10/07/why-the-mobile-payments-space-is-the-most-exciting-space-in-tech-right-now/>.
13. eMarketer, "How popular are mobile in-store payments?"
14. Deloitte analysis, based on the sales and customer transactions of major retailers, coffee shops, and fast food chains during 2013–14.
15. EMV is a global standard for the interoperation of smart chip-enabled credit/debit cards and capable point of sale (POS) terminals and automated teller machines (ATMs), for authenticating credit and debit card transactions.
16. Liability shift: The liability shift is scheduled to happen in October 2015. Post the liability shift, whenever there is an incidence of card fraud, then whichever party has the lesser technology will bear the liability of the fraud. For example, if a merchant is not accepting a chip and pin-based card and the customer has one, then the retailer will

- be liable for the fraud cost. Based on Tom Gara, *WSJ*, <http://blogs.wsj.com/corporate-intelligence/2014/02/06/october-2015-the-end-of-the-swipe-and-sign-credit-card/>.
17. Bill Hardekopf, "The big data breaches of 2014," *Forbes*, January 2015, <http://www.forbes.com/sites/moneybuilder/2015/01/13/the-big-data-breaches-of-2014/>.
 18. According to the EMV Migration Forum (an independent, multi-industry entity created to promote secure EMV technology), 4.5 million (32 percent) of 13.9 million total POS terminals in the United States were already EMV compliant at the end of 2014. Reflecting broader POS availability, 120 million (10 percent) of 1.2 billion credit or debit cards issued in the United States in 2014 were EMV-compliant. Based on Tracy Kitten and Jeffery Roman, *Bank info security*: "infographic: U.S. migration to EMV," <http://www.bankinfosecurity.com/infographic-us-migration-to-emv-a-7785/>; Rian Boden, "Six in ten US terminals to support EMV chip cards by year end," *NFC World*, February 2015, <http://www.nfcworld.com/2015/02/19/334214/six-in-ten-us-terminals-to-support-emv-chip-cards-by-year-end/>.
 19. Deloitte, "2014 Global Mobile Consumer Survey: US Edition."
 20. Charles Arthur, "The death of the featurephone in the UK—and what's next," *Guardian*, April 2014, <http://www.theguardian.com/technology/2014/apr/30/featurephone-smartphone-uk->.
 21. Cliff Kuang, "Disney's \$1 billion bet on a magical wristband," *Wired*, March 2015, <http://www.wired.com/2015/03/disney-magicband/>.
 22. Deloitte, "2014 Global Mobile Consumer Survey: US Edition."
 23. Press release, IHS, "NFC-enabled cellphone shipments to soar fourfold in next five years," February 2014, <http://press.ihs.com/press-release/design-supply-chain/nfc-enabled-cellphone-shipments-soar-fourfold-next-five-years>,
 24. Dominic Basulto, "Why the mobile payments space is the most exciting space in tech right now," *Washington Post*, October 2014, <http://www.washingtonpost.com/blogs/innovations/wp/2014/10/07/why-the-mobile-payments-space-is-the-most-exciting-space-in-tech-right-now/>.
 25. Mark Bergen, "Play to pay: Handicapping the race to win in mobile payments," *AdvertisingAge*, March 2015, <http://adage.com/article/digital/google-samsung-apple-race-win-mobile-payments/297704/>
 26. Deloitte, "2014 Global Mobile Consumer Survey: US Edition."
 27. Rian Boden, "Six in ten US terminals to support EMV chip cards by year end."
 28. Deloitte analysis, based on a study of mobile payments products and solutions of 36 solution providers in United States during 2013–15.
 29. Deloitte analysis, based on a study of mobile payments products and solutions of 36 solution providers in United States during 2013–15.
 30. Patrick Gray, "The liability shift and its impact on mobile payments," *TechRepublic*, February 2015, <http://www.techrepublic.com/article/the-liability-shift-and-its-impact-on-mobile-payments/>.
 31. Danny Fundinger, "A complete guide to mobile wallets: Ten things you need to know," IBM Mobile First Blog, April 2015, <http://asmarterplanet.com/mobile-enterprise/blog/2015/04/a-complete-guide-to-mobile-wallets.html>.
 32. Ron Herman, "App overload: Mobile payments adding convenience or confusion?," [mobilepaymentstoday.com](http://www.mobilepaymentstoday.com/blogs/app-overload-mobile-payments-adding-convenience-or-confusion/), July 2014, <http://www.mobilepaymentstoday.com/blogs/app-overload-mobile-payments-adding-convenience-or-confusion/>.
 33. Brian Krebs, "How was your credit card stolen?," *krebsonsecurity.com*, January 19, 2015, <http://krebsonsecurity.com/2015/01/how-was-your-credit-card-stolen/>.
 34. Automated Clearing House (ACH) is an electronic network for financial transactions in the United States. ACH is a computer-based clearing and settlement facility established to process the exchange of electronic transactions between participating depository institutions. ACHs represent a vehicle for banks and retailers to disintermediate traditional card networks and their transaction fees which they perceive to be exorbitant.
 35. Troy Land, "The rise of alternative payment types: Private label ACH cards," *paymentsleader.com*, <http://www.paymentsleader.com/private-label-ach-cards/>.
 36. Deloitte analysis, based on a study of mobile payments products and solutions of 36 solution providers in United States during 2013–15.

37. AIRTAG, "AIRTAG launches AIRPASS multi-platform white label mobile wallet," February 2013, <http://www.airtag.com/en/about-us/news/2013/latest-news-airtag-launches-airpass-multi-platform-white-label-mobile-wallet/>.
38. Lorna Pappas, "U.S. retailers lose \$54 billion a year to shrink," *retailtouchpoints.com*, November 2013, <http://www.retailtouchpoints.com/retail-store-ops/3033-us-retailers-lose-54-billion-a-year-to-employee-theft>.
39. The surveys examined include Val Srinivas, Sam Friedman, and Jim Eckenrode, *Mobile financial services*, May 2014; Deloitte Digital, *The new digital divide*, January 2014; Deloitte University Press: Tech Trends, February 2014; Deloitte, "Global mobile consumer survey (US edition)," October 2013; Deloitte, *Digital democracy survey*, May 2014; Pat Conroy, Rich Nanda, and Anupam Narula, *Digital commerce in the supermarket aisle*, December 2013; Deloitte Digital, *The dawn of mobile influence*, March 2012; Deloitte, *The 2014 American Pantry Study*, May 2014.
40. Jay Weber, "The future of payment security: Tokenization," *paymentsleader.com*, <http://www.paymentsleader.com/the-future-of-payment-security-tokenization/>; Simon Keates, "Getting smart about authentication methods for mobile payments," *Information Week*, June 2014, <http://www.banktech.com/getting-smart-about-authentication-methods-for-mobile-payments/a/d-id/1297073?>.
41. Ittai Barziley, "Apple Pay's Black Friday, By the numbers," *InfoScout Blog*, December 2014, <http://blog.infoscout.co/apple-pays-black-friday-by-the-numbers/>.
42. Pat Conroy, Frank Milano, Anupam Narula, and Raj Singhal, *Building consumer trust*, Deloitte University Press, December 2014, <http://dupress.com/articles/consumer-data-privacy-strategies/>.
43. Ibid.
44. Deloitte analysis based on the analysis of the profit margins of top 20 listed US retailers by revenues during 2007–14. While brick-and-mortar retailers account for more than 90 percent of revenue share in retail trade, retailers are highly sensitive to technology change. Based on the US Census, "Monthly and annual retail trade," <http://www.census.gov/retail/>.
45. Recent estimates of industry's costs to upgrade to new EMV terminals (compatible with mPay@POS) are around \$6.5 billion—based on *paymentsleader.com*, *Will retailers be ready for EMV by Oct 2015?*, <http://www.paymentsleader.com/will-retailers-be-ready-for-emv-by-oct-2015/>; Estimated costs to upgrade \$250–\$450 per POS terminal—based on Ruth Reader, "Forget about payment apps: The new battle is around payment terminals," *Venturebeat.com*, October 2014, <http://venturebeat.com/2014/10/29/forget-about-payment-apps-The-new-battle-is-around-payment-terminals/>.
46. Mary Ellen Biery, "Which retailer type is most/least profitable?," *Forbes*, <http://www.forbes.com/sites/sageworks/2011/11/11/which-retailer-type-is-mostleast-profitable/>.
47. Elizabeth Palermo, "Credit card processing companies: A list of 60+ processors," *Business News Daily*, April 2014, <http://www.businessnewsdaily.com/6239-credit-card-processing-companies.html>; LetsTalkPayments.com, "14 payments APIs that made waves in 2014," January 2015, <http://letstalkpayments.com/14-payments-apis-made-waves-2014/>.
48. Ittai Barziley, "Apple Pay's Black Friday, By the numbers," *InfoScout Blog*, December 2014, <http://blog.infoscout.co/apple-pays-black-friday-by-the-numbers/>.
49. In the survey, the top two barriers to consumer adoption were convenience factors: 66 percent of consumers cited difficulty in typing credentials on a smartphone screen, while 61 percent cited difficulty with Internet access based on Val Srinivas, Sam Friedman, and Jim Eckenrode, *Mobile financial services*, Deloitte University Press, May 2014, <http://dupress.com/articles/mobile-financial-services/>.
50. Will Hernandez, "Google gets back into mobile payments with Android Pay," *mobilepaymentstoday.com*, May 2015, <http://www.mobilepaymentstoday.com/articles/google-gets-back-into-mobile-payments-with-android-pay/>.
51. Conroy, Milano, Narula, and Singhal.
52. Michael Barris, "Beacon networks grow as adoption accelerates," *Mobile Marketer*, November 2014, <http://www.mobilemarketer.com/cms/news/software-technology/19201.html>.
53. Conroy, Milano, Narula, and Singhal, *Building consumer trust*.
54. Jim Higgins (managing director, Jim Higgins & Associates—Payment Strategy Consultants), interview with authors, August 13, 2014.
55. Deloitte analysis, based on a study of mobile payments products and solutions of 36 solution providers in the United States during 2013–15.
56. Conroy, Milano, Narula, and Singhal, *Building consumer trust*.

57. The average US household belongs to more than 21 loyalty programs; based on Krystina Gustafson, "Loyalty members hate these five things," *CNBC*, April 2015, <http://www.cnbc.com/id/102557852>.
58. Pat Conroy, Rich Nanda, and Anupam Narula, *Digital commerce in the supermarket aisle*, Deloitte University Press, December 2013, <http://dupress.com/articles/supermarket-digital-commerce-cpg-strategies/>.
59. The average US household belongs to more than 21 loyalty programs; based on Gustafson, "Loyalty members hate these five things."
60. Drew Woolley, "Macy's launches a digital wallet," *FierceMobileRetail*, August 2014, <http://www.fierceretail.com/mobileretail/story/macys-launches-digital-wallet/2014-08-28>.
61. Deloitte's consumer survey identified that waiting at checkout queues was one of the major drawbacks for in-store shopping by consumers, based on Conroy, Nanda, and Narula, *Digital commerce in the supermarket aisle*.
62. Apple, "Apple Watch, double-click to pay and go," <https://www.apple.com/apple-pay/>. Apple Watch and Apple Pay are trademarks of Apple Inc., registered in the United States and other countries. The current report is an independent publication and has not been authorized, sponsored, or otherwise approved by Apple Inc.
63. Press release, "comScore reports November 2014 U.S. smartphone subscriber market share," comScore, January 2015, <http://www.comscore.com/Insights/Market-Rankings/comScore-Reports-November-2014-US-Smartphone-Subscriber-Market-Share>.
64. Davey Alba, "Google Wallet is now poised to compete with Apple Pay after its deal with Softcard," *Wired*, February 2015, <http://www.wired.com/2015/02/google-wallet-now-poised-compete-apple-pay-deal-softcard/>.
65. Deloitte analysis, based on the analysis of profit margins of the top 20 listed US retailers by revenues during 2007–14.
66. The potential role of sensors in mPay-at-POS solutions is one way in which mPay-at-POS systems participate in the Internet of Things. To learn more about the Internet of Things, see <http://dupress.com/collection/internet-of-things/>.
67. Deloitte, "2014 Global Mobile Consumer Survey: US Edition."
68. Zapp Mobile Payments is a UK-based solution provider that allows customers to make purchases both online and at the point of sale. The solution will be launched in 2015; <http://www.zapp.co.uk/>.
69. The Zapp Team, "Millennials and mobile payments," Zapp, December 2014, <http://www.zapp.co.uk/blog/tag/apps>.
70. Conroy, Milano, Narula, and Singhal, *Building consumer trust*.
71. Rian Boden, "Six in ten US terminals to support EMV chip cards by year end."
72. Jay Weber, "The future of payment security: Tokenization," *Payments Leader*, <http://www.paymentsleader.com/the-future-of-payment-security-tokenization/>.
73. Authorize.net, "Apple Pay for Authorize.Net," <http://developer.authorize.net/api/applepay/>.
74. Charles Graeber, "Ten days in Kenya with no cash, only a phone," *Bloomberg Business*, June 2014, <http://www.bloomberg.com/bw/articles/2014-06-05/safaricom-m-pesa-turns-kenya-into-a-mobile-payment-paradise>.
75. In June 2013, the FDIC sponsored the third National Survey of Unbanked and Underbanked Households to collect data on the number of US households that are unbanked and underbanked, their demographic characteristics, and their reasons for being unbanked and underbanked. 7.7 percent (1 in 13) of households in the United States were unbanked in 2013. This proportion represented nearly 9.6 million households. 20 percent of US households (24.8 million) were underbanked in 2013, meaning that they had a bank account but also used alternative financial services (AFS) outside of the banking system based on "2013 FDIC National Survey of Unbanked and Underbanked Households," Federal Deposit Insurance Corporation, <https://www.fdic.gov/householdsurvey/>.
76. Deloitte, "2014 Global Mobile Consumer Survey: US Edition."

Contacts

Preeti M. Banerjee

Senior manager

Deloitte Services LP

+1 617 585 4754

pbanerjee@deloitte.com

Mike Curran

Senior manager

Deloitte Services LP

+1 404 220 1152

mcurran@deloitte.com

Craig Wigginton

Partner

Deloitte & Touche LLP

+1 212 436 3222

cwiginton@deloitte.com

Brian Shniderman

Principal

Deloitte Consulting LLP

+1 602 234 5233

bshniderman@deloitte.com

Acknowledgements

The authors would like to thank **Karthik Ramachandran** and **Shashank Srivastava** of Deloitte Services LP for their contributions. Additional research support was provided by **Prathima Shetty** and **Negina Rood** of Deloitte Services LP.

For their contributions to the development and review of this article, the authors extend their thanks to **Rakesh Kumar**, **Mike Curran**, **Brian Shniderman**, **Eric Piscini**, **Kasey Lobaugh**, **Simon Lapscher**, **Prakash Santhana**, and **Nakul Lele** from Deloitte Consulting LLP, as well as **Michael Raynor**, **Jim Eckenrode**, **Val Srinivas**, and **Anupam Narula**.



Follow @DU_Press

Sign up for Deloitte University Press updates at DUPress.com.

About Deloitte University Press

Deloitte University Press publishes original articles, reports and periodicals that provide insights for businesses, the public sector and NGOs. Our goal is to draw upon research and experience from throughout our professional services organization, and that of coauthors in academia and business, to advance the conversation on a broad spectrum of topics of interest to executives and government leaders.

Deloitte University Press is an imprint of Deloitte Development LLC.

About this publication

This publication contains general information only, and none of Deloitte Touche Tohmatsu Limited, its member firms, or their related entities (collectively the "Deloitte Network") is, by means of this publication, rendering professional advice or services. Before making any decision or taking any action that may affect your finances or your business, you should consult a qualified professional adviser. No entity in the Deloitte Network shall be responsible for any loss whatsoever sustained by any person who relies on this publication.

About Deloitte

Deloitte refers to one or more of Deloitte Touche Tohmatsu Limited, a UK private company limited by guarantee ("DTTL"), its network of member firms, and their related entities. DTTL and each of its member firms are legally separate and independent entities. DTTL (also referred to as "Deloitte Global") does not provide services to clients. Please see www.deloitte.com/about for a more detailed description of DTTL and its member firms.

Deloitte provides audit, tax, consulting, and financial advisory services to public and private clients spanning multiple industries. With a globally connected network of member firms in more than 150 countries and territories, Deloitte brings world-class capabilities and high-quality service to clients, delivering the insights they need to address their most complex business challenges. Deloitte's more than 200,000 professionals are committed to becoming the standard of excellence.

© 2015. For information, contact Deloitte Touche Tohmatsu Limited.