

A Value Framework for Mobile Payment with Examples from Selected Asian Countries



ISBN: 978-1-943295-02-9

Kiera Carvalho¹
Jennifer Evans
Heather Toll
Taylor Walker
Paul Prisco
Milain Bui
James Frakes
Kala C. Seal²

Loyola Marymount University in Los Angeles

(kierac98@gmail.com)
(jennyevans83@gmail.com)
(htoll1007@gmail.com)
(taylorwalker001@gmail.com)
(paulmprisco@gmail.com)
(milan2188@gmail.com)
(jfrakes@lion.lmu.edu)
(kala.seal@lmu.edu)

Mobile Payment is considered to be a potentially disruptive agent for payment mechanisms currently existing in various markets. With the integration of NFC technologies in new smart phones, that possibility is on the verge of becoming reality. However creating widespread adoption of mobile payments is still a huge challenge because of the complexities involved in delivering compelling values beyond those already offered by existing payment systems. We present a framework to systematically investigate the values and the barriers associated with mobile payment systems and validate it with examples from our field research in the US, South Korea, Japan and China.

Keywords: Mobile Payment, Mobile Proximity Payment, NFC Payment, Mobile Wallet, Mobile Payment Culture

1. Introduction

The payments world is on the verge of a real disruptive change with the recent introduction of mobile payments. The recent development in the convergence of policy, ecosystems, and infrastructure along with explosive growth of smartphone ownership is poised to create a crucial shift in consumer behavior that will lead us into an era where the mobile device will become the mainstream choice for payments, especially in Mobile Proximity Payments (MPP).

While the future scope and horizon for MPPs look hopeful, there are still several barriers and issues that must be overcome to make it a complete reality. Early research in this area has yielded a number of models, theories, frameworks, and heuristics regarding technology adoption and business strategies for mobile, web, and MPP transactions (see, for example, Contini & Crowe, 2011; Mallat, 2006; Dahlberg, 2015). However, it seems that a cohesive framework focused exclusively on MPPs is yet to be developed. The ecosystem needed to support MPP is more complex than that required for traditional payments. The ecosystem is dependent on multiple macro factors besides technology and it is important to understand how those factors interact with and influence the various components of such an ecosystem. Furthermore, the success path may not be the same in all environments; markets and consumer culture play a significant role in the adoption of MPP and therefore, cross-cultural analysis across various markets are needed to identify the key influencers and drivers for MPP adoption. The technology is new, the models are still being built and all the players in the payments ecosystem are carefully watching the developments within mobile payments, especially in the MPP space. What role each player will play in this disruption of the traditional payment system is of key interest to researchers and industry experts alike. In this paper, we present the results of a research work that investigated the current state of MPPs in South Korea, China, Japan and the US. Based on our findings from the literature and the field research, we present a framework called the 7C framework that can provide guidance in understanding the scope of MPPs in a particular setting as well as offer a mechanism for discovering the relevant drivers and influencers for mass adoption of MPPs across different markets.

We continue the paper with a basic definition of mobile payments and a description of the ecosystem needed to sustain mobile payment. We then present our framework and apply it to create a comparative analysis of adoption of mobile payments across the four countries listed above. We conclude by identifying the significant factors that affect the adoption of mobile payments along with suggestions that can help companies in effectively utilizing this new opportunity.

¹ All authors are affiliates of Loyola Marymount University in Los Angeles, CA, USA.

² Corresponding author

2. Mobile Payments: Definitions and Categories

The term mobile payment is rather broad and many definitions persist in literature. For our paper, we will define mobile payments as financial transactions taking place through the mobile phone in exchange for goods or services. Mobile payment can fall into one of two main categories: remote transactions and proximity-based transactions (Shin et al., 2014).

During a **remote transaction**, the user accesses the internet via a mobile device in order to process a payment through an online server. This is akin to making a payment on a web browser and the user's account information is not stored on the mobile device (Shin et al., 2014). Peer-to-peer, non-commercial transactions fall under this category. Paying for goods or services on websites like Amazon.com via a mobile phone or retail shopping through a mobile app or device as well as also banking applications where consumers pay bills and deposit checks through their mobile devices also fall under the umbrella of remote mobile payments.

Mobile proximity payments, on the other hand, consist of payments made via a mobile phone at physical retail locations and are not dependent on the device's access to the mobile network (Crowe et al., 2010). User financial information is stored on the mobile device and the transaction is completed using proximity-based technology, such as barcodes, QR codes, or NFC protocols (Shin et al., 2014). Table 1 shows the categorizations of the different types of mobile payments.

Table 1 Four Forms of Mobile Payment (from Shin et al., 2014, pp 1365)

	Remote Mobile Payment			Proximity Mobile Payment
	Mobile Banking	Mobile Shopping	Mobile P2P	Mobile POS
Bank Account/Credit Card Requirement	Bank Account	Credit/Debit Card	Credit/Debit Card/Bank Account	Credit/Debit Card/Prepaid Card
Smartphone/Internet Requirement	Smartphone, mobile banking app, wireless internet	Smartphone, online shopping app, wireless internet	Smartphone, PayPal app, wireless internet	NFC enables smartphone, POS app
Examples	Bank bill payment, check deposits	Amazon.com purchasing through smartphone	PayPal through smartphone	McDonalds', Trader Joe's contactless mobile payment
Service Providers	Financial Institutions	Online retailers/credit card company	PayPal, Clear Xchange	Apple Pay, ISIS, Google Wallet, PayPal Wallet, Square

For our paper, mobile payments mainly refers to MPP, the newest payment services which are offered as a direct competitor to cash and credit/debit cards in brick-and-mortar transactions. We also include pre-paid applications that allow customers to purchase and redeem services via coupons (e.g. Groupon, LivingSocial, and Starbucks) on their mobile phones. These sorts of transactions have been collectively referred to as contactless payments, mobile proximity payments, Mobile Credit Cards (MMC), and mobile wallets. Within this paper we will use mobile proximity payments (MPPs) to represent all of the above transaction types.

3. Payment Flow in Traditional and Mobile Environment

A mobile proximity payment is initiated by the consumer by bringing the device within a few inches of a reader, typically a Point of Sales (POS) terminal. The device then sends information, stored on the mobile device, to the retailer's POS system, and this transmission can occur whether or not the mobile phone has power or is connected to the mobile network (depending on the payment type) (Crowe et al., 2010). Transition of information typically happens through one of the four technologies: QR code, IC and EMV chips, NFC or Magnetic Secure Transmission. All of the above technologies are well described in the literature. Interested readers can refer to Hayashi (2012) for an excellent discourse of all the methods.

In order to understand the current landscape of mobile payments, it is important to first understand traditional payment methods and then examine how mobile payments fit into the overall scheme.

Traditional credit card transactions are typically facilitated by two types of banks: the issuing bank and the acquiring bank. The issuing bank houses the consumer's payment account. The acquiring bank clears and funds transactions for the merchant. Some banks operate as both the issuer and acquirer (Dewan, 2005). Credit card companies, like Visa and MasterCard, manage the transaction flow, authentication and security measures and charge fees to both consumers and merchants in order to profit from these transactions. Merchants are charged a percentage of the purchase price (typically between 1-4%) while card owners are typically charged annual fees, interests on unpaid balances, and late fees.

A typical transaction involving a credit card provided to a consumer by an issuing bank begins when the cardholder makes a purchase from a merchant. The merchant authenticates the transaction by informing the acquiring bank of the transaction and is reimbursed the amount of the sales ticket less a "discount fee" (the amount the bank charges for facilitating the transaction). The acquiring bank subsequently submits the transaction to the issuing bank for payment. The issuing bank then pays the acquiring bank for the demanded amount less an interchange fee. The issuing bank gets paid by the customers through its monthly bills. Figure 1 explains this chain of events. In this figure, the card associations are the credit card companies (e.g. Visa and MasterCard) and their role is to mediate the transactions between the issuing and acquiring banks and to provide much of the necessary infrastructure to support financial institutions in issuing and processing debit and credit cards.

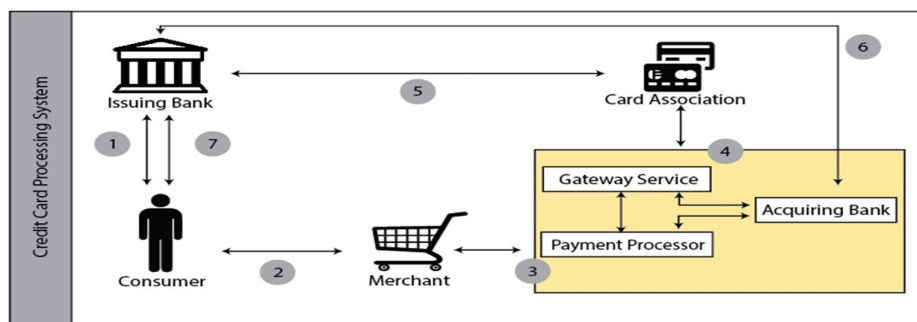


Figure 1 Typical Credit Card Payment Transaction Flow

When mobile payments are included into the transaction chain, the consumer initiates the process in much the same way as with a traditional card only by replacing it with a mobile device that stores the card information. The transaction data is still forwarded to the issuing bank by the acquiring bank. The issuing bank then identifies the phone and account from which the payment is to be made and either authorizes or declines the transaction. The difference is that, through tokenization and biometrics (such as built-in fingerprint readers), the transaction is more secure than a traditional magnetic-strip card and a two-way data store and communication can be initiated thereby opening up pathways for richer customer interactions. Some of the significant changes that have recently happened in the security of the credit card as well as mobile phone-based payments are tokenization and presence of secured element transaction (SET). Figure 1 shows that credit card information must flow between various parties through an information network for a transaction to be authenticated and completed successfully. Additionally, the transaction details along with the payment instrument information (e.g. credit card number and other details) must be stored in various databases for reconciliation and repudiation at a later date. This opens up the process and payment information for security breaches and for possible fraudulent activities on the account through hacking on the network and/or on the storage databases. Modern chip-based technology in credit cards and the SET element in the mobile phones overcome that issue by creating a temporary digital token for every transaction. The token does not contain the actual credit card or the payment instrument details; it is an encrypted digital stream with enough information that can be used for authentication as well as for later reconciliation and repudiation of the transaction. Since the token is generated dynamically for each transaction, it remains valid only for that transaction and thus cannot be used for any future transaction. This greatly improves the security and reduces the probability of fraud thereby creating huge potential savings for the banks and the credit card companies. Consumers are also protected and merchants are typically charged a reduced transaction fee when a tokenized system is used. This has, as we will see later, a huge impact on mass adoption of MPP.

MPP can be typically used in one of two payment modes: prepaid (pay first, use later) or postpaid (use now, pay later). In the case of the pre-paid model, a customer's mobile account is pre-loaded with a set amount of money that can be used for payment in an MPP transaction. Each purchase reduces the available balance by the purchase amount and the transactions stop when the balance becomes insufficient for making payments. The user then can reload the account and continue. The post-paid model, on the other hand, works like a credit or a debit card and the settlement is done either through electronic bank transfers or through monthly bills that are sent to the customers. The funding for the MPP models can be done through a linked bank account or account with a nonbank payment provider (such as PayPal), through SIM card of the device that can be loaded through bank transfers, small shops that act as top-off agents or through payment kiosks, or through traditional credit, debit, or prepaid cards after they are loaded in the mobile phones through an app. Often multiple payment instruments can be consolidated into one app on the mobile device through a "mobile wallet" application.

4. Mobile Payment Ecosystem and the Stakeholders

While the consumer and the merchant are key stakeholders in all commerce related transactions, in mobile proximity payments, there are many more stakeholders, each with a vested interest in the transaction. The widespread interests of these stakeholders has led to the "chicken or the egg" conundrum that has inhibited the spread and rapid adoption of MPPs. The following section provides a brief description of each of the stakeholders and their roles in the MPP ecosystem.

Consumers: Additional values and features need to exist in order to differentiate MPPs from other payment methods and to convince consumers to switch from their preferred mode of spending (Contini & Crowe, 2011). This is truer in developed countries where a credit card culture is already entrenched. Some examples of value-added opportunities for consumers are; reduced transaction times, consolidation of payment methods such as coupons, loyalty cards, etc. (Shin et al., 2014), increased satisfaction through personalized coupons or points, and improved product knowledge through targeted advertising (ABI Research, 2015).

Merchants: Without a broad network of merchants accepting mobile payments, there is little chance for widespread consumer adoption of MPP (Contini & Crowe, 2011). Unfortunately, uncertain consumer demand makes it uneconomical for many merchants to deploy physical software and hardware upgrades to accept MPPs (Contini, & Crowe, 2011). Thankfully,

some new technology like Samsung's LoopPay that allows simulation of a magnetic strip card through mobile devices, has emerged, which allows merchants to accept mobile payments without the need to upgrade their POS hardware to accept NFC signals.

Merchants are inclined to support whatever payment options are preferred by consumers in order to guarantee maximal sales. Additionally, merchants want the payment process to be "pleasant and seamless" (Dewan, 2005). As consumers increase utilization of MPPs, merchants will be inclined to implement the technology to support this consumer practice. Merchants are also interested in security, timely settlements, manageable investment infrastructure, relief from costly data protection inspection obligations, and reasonable interchanges for transactions (Contini & Crowe 2011) and most of them can be delivered better through MPP.

Mobile Network Operators/carriers (MNOs): Currently in the US, MNOs own customer billing infrastructures which can be leveraged to add value to existing voice and data services through MPPs. However, these MNOs are new to financial services and lack the security protections learned through experience in the field (Contini & Crowe, 2011; Crowe et al., 2013).

Issuing and acquiring banks (aka financial institutions): It is in the best interest of financial institutions to remain in the center of a customer's account relationship by issuing payment credentials for MPPs the same way they do for traditional payments (Contini & Crowe, 2011). Offering MPP services to the consumer adds value to the existing services and has the potential to improve customer retention (8). Additionally, studies analyzed by the Boston Fed have found that customers "have more trust in mobile payment solutions driven by financial institutions and/or credit card companies than alternative providers," providing banks an advantage in the MPPs playing field (Crowe et al., 2013).

Merchant Service Providers (MSP)/Transaction Processing System Providers: Merchant Service Providers have a critical role in MPPs, as they are the "middlemen" in any credit/debit card transaction, including those initiated by MPPs (Dewan, 2005). While their role includes acting as the clearinghouse for transactions, this role is not unique to mobile payment processing. Like merchants, the interest of the MSP is to provide options the consumer desires. The most notable example of MSP is Square with their small smartphone based terminals. Other examples of MSPs include Chase Paymentech, First Data Merchant Services, and BA Merchant Services.

Credit Card Companies: Credit card companies such as Visa, MasterCard, American Express, etc. have become the stakeholder responsible for providing credentials to secure elements (SET) in mobile phones. This is an essential tool to providing secure mobile proximity payments (Contini & Crowe, 2011). Credit card companies stand to gain a great deal through the acceptance of MPPs. If they are able to attach their brand to the most popular MPP platforms, they will continue to enjoy profits in the form of merchant and consumer fees while benefiting from the improved security provided.

Government Regulators: Mobile payment transactions pose new risks in payment processing and security concerns, as well as introduce new parties into the payment transaction. In the interest of the consumer, and to provide clarity to the participants in the MPP value chain, there is a need for regulatory oversight from one or more government agencies experienced in managing such concerns (Crowe et al., 2013). Governmental regulation helps both in addressing privacy and security concerns, but also in securing uniform interoperability standards across stakeholders in the ecosystem. In the US, the existing regulation for payment transactions needs to be extended for all mobile payments, including retail locations as well as web and mobile peer-to-peer (P2P) payments (Crowe et al., 2013). In the other countries we examined, government regulation is closely tied to the culture of the local government, largely driven by the level of government concern over consumer privacy protection.

Mobile Operating Systems & Software Developers: Mobile Operating Systems are key to integrating the functionality of MPPs built into handsets. Mobile software developers have an opportunity to encourage the use of mobile proximity payments by developing software that can offer added value.

Handset & Terminal Manufacturers: In order for consumers to use MPPs, they need: (1) a smartphone with the hardware to support mobile payment options (such as NFC) and the related security software, (Contini & Crowe, 2011) (2) the operating system to enable the transaction, (3) a software application that can orchestrate communication, and security elements between the phone's hardware and the merchant terminal and provide added services to the user, and (4) a retailer with a MPP-enabled terminal. By building this functionality into their products, smartphone and terminal manufacturers increase the opportunities for consumers to use MPPs. Handset manufacturers are also key in addressing basic functionality issues, such as whether the phone needs to be on or connected to a mobile network in order to complete a payment (Contini and Crowe, 2011; Crowe et al., 2013).

As evidenced by the number and variety of stakeholders involved, the MPP ecosystem is complex and interweaving, with relationships established between multiple stakeholders and roles in the payment transaction overlapping. Many of these stakeholders are still independently trying to understand the value addition from mobile proximity payments but they are all focused on their own self-interests. In order for stakeholders to achieve successful adoption of MPPs there has to be a

consensus on the fundamental principles of MPP adoption. A universal framework, therefore, is necessary for understanding the “big picture” of MPPs and the interdependent interests of various stakeholders. We have developed a framework that identifies seven factors considered essential to the adoption of MPPs and we have named it “The 7Cs Framework.” The seven Cs consist of two influencers (Cost, Culture) and five drivers (Coupon, Continuity, Convenience, Consolidation, and Control). The influencers can be positive or negative, and are seen to have the greatest impact on MPP adoption. The drivers are value-added incentives that stakeholders seek to add to the MPP landscape in order to be competitive. Without the influencers (Cost and Culture) being positive, it is almost impossible for MPPs to thrive. The details description of the framework and the associated explanations follow.

5. 7Cs Framework

Before delving into the description of our framework, it is important to see the existing body of work on the influencers and barriers of MPP. There are a vast number of studies on the increasing use of mobile payments and mobile money globally, particularly in developing countries. Some studies, for instance, focused only on related mobile services, such as “m-finance” and mobile banking, with primary research conducted in developing countries, including Africa and India, but did not extend them to MPP adoption (Duncombe & Boateng, 2009). Other studies considered the barriers to MPP adoption, but did not identify potential drivers. Diniz (2011), in his study of mobile payment spanning over a decade, cited a number of barriers and identified two primary issues faced by MPP adoption: security issues and the unwillingness to adopt by both consumers and merchants (Diniz, 2011). In another literature review paper, Dahlberg identified “inner” and “outer” factors that determine market structure, but these factors are not tied to specific stakeholders (Dahlberg, 2008; Dahlberg et al., 2015). Past research has also considered drivers that affect consumer habits. Hayashi identified four factors that affect all payment types: convenience, cost, security, and merchant acceptance (Hayashi, 2012). Additional research has confirmed that these factors, excluding merchant acceptance, are most important to consumers (Shin et al., 2014; Herzberg, 2003 and Jang, 2009). In a focus group study, Mallat (2006) evaluated factors affecting consumer adoption: relative advantage, compatibility, complexity, costs, network externalities, trust, and perceived security risks. Mallat’s results suggest that the relative advantages of mobile payments include time and place independence, availability, possibilities for remote purchases, and queue avoidance. The results also suggest that the relative advantages of mobile payments depend on certain situational factors such as lack of other payment methods or urgency. The paper also identified several barriers to adoption including premium pricing of the payments, complexity of payment procedures, a lack of widespread merchant acceptance, and perceived risks. The findings from Mallat’s study suggest that more attention should be paid in particular to usability and pricing of the service, and creation of critical mass. Yan and Yang (2015) studied the factor of trust in mobile payment adoption in China, and indicated that mobile payment user behavior is affected by trust.

Throughout the research articles, there is overlap in the barriers that are limiting adoption. The current literature has also outlined how select uses for proximity transactions, especially in public transportation payments, have paved the way for MPPs and have helped build up the infrastructure necessary for widespread MPP adoption. Hayashi (2012) indicated how the commuting needs and culture of Japanese and South Korean commuters helped them in quickly adopting the MPP system. In most of the examples cited in the literature, the push for MPP originated from a vested stakeholder other than the merchant and the customers. However, the spread of MPPs is still limited by both consumer and merchant adoption and the view of the value analysis of the overall ecosystem is still fragmented. We hope that our framework will provide an integrated view for understanding the factors, both positive and negative, that influence adoption and the value-propositions that can drive MPPs.

5.1 Influencers

Culture: Culture can greatly affects consumer willingness to adopt MPPs, both positively and negatively. Some cultures are inclined to accept new technology more quickly than others. These technology acceptance levels can be driven by population demographics including consumer age and education level (Lee et al., 2004). For example, China and Japan are primarily cash-based cultures, while credit cards are preferred in South Korea and the US. A tendency to prefer the use of cash can affect a person’s inclination to try a new form a payment, especially if this method of payment may be perceived as less secure (Lee et al., 2004).

Cost: The cost of upgrading terminals and technology to support MPPs has been a major influencer of merchant decisions to utilize mobile payments. If the cost of implementation is subsidized and the technology widespread, then it will have a positive effect on adoption. But, cost can also be a barrier if the cost does not outweigh the perceived benefits. Cost also impacts the buy-in of other stakeholders, especially financial institutions, merchant service providers, and credit card companies. The cost to consumers involves purchasing mobile devices capable of handling MPPs. Because this technology is quickly becoming mainstream, cost does not generally affect consumers in developed nations, but can still be an issue for countries with lower income levels.

5.2 Drivers

Convenience: Convenience considers the ease of use for consumers and merchants. The more friction is reduced in the purchasing process, the more appealing MPPs will become to both consumers and merchants. Convenience considers how compatible MPP is with the consumer’s lifestyle and how it complements the consumer’s purchasing habits (Shin et al., 2011). In Japan, proximity ticketing in the transit system increased convenience by reducing the turnstile transaction time to 1

millisecond (About FeliCa from Sony Global website). Also in Japan, by combining the proximity ticketing with proximity payment solutions at convenience stores and vending machines within the transit stations, MPP increased convenience of making these micro-purchases for the busy Japanese commuter, as they moved through the station. (Yamamoto, 2015).

Continuity: Related to convenience, continuity incorporates MPPs into the daily flow of consumer life. The aim is to make the use of MPPs a part of the consumer's routine, to create a regular habit of using MPPs over other payment methods.

Consolidation: The technology behind MPP allows for the consolidation of the consumer's physical wallet, bundling items like credit and debit cards, loyalty cards, membership cards, etc. into a single "mobile wallet" within the consumer's mobile device.

Control: While consolidation combines the many cards carried by consumers into one application, merely mimicking a physical wallet in a mobile form, control makes the mobile wallet greater than the sum of its parts. Control can be implemented in the mobile wallet through two primary functions: budgeting and "smart" payments. Budgeting tools can be integrated into the mobile wallet, syncing all wallet contents and giving the consumer real-time control. A "smart" mobile wallet could take the decision of which card to use away from the consumer, in order to make better, more intelligent purchasing decisions, such as maximizing rewards for cash-back points or airline miles.

Coupons and CRM: MPPs can be a tool for merchants to improve marketing efforts, helping to tailor coupon campaigns based on time, location, and individual consumer data. Likewise, coupon is a driver in the form of savings for consumers, an opportunity for merchants to enhance the customer relationship (ABI Research, 2015). MPP provides a way of creating an intelligent wallet because of the computing power as well as the two way communication capabilities of mobile phones. As a result, the customer can be reached by the merchant and relevant offers can be given to entice the consumers back for more purchases.

6. Country Specific Analysis of MPP using 7Cs Framework

A significant part of the present research entailed conducting field study about the current state of MPP and the associated influencers and drivers in the US, South Korea, China and Japan. We utilize our framework to explain the findings as well as explore the positions of stakeholders in those countries. In the following sections we present our findings for each country. The narrative for each country starts by describing the current MPP landscape followed by an analysis of each of the Cs in our 7Cs framework and their effects on the current state as well as future directions of MPP in that country.

6.1 United States

In the US, mobile payment started with SMS based payment like Obopay (Crowe et al., 2013) but as the interests of major tech firms and mobile companies in the US, including Google Inc., PayPal Inc. and Softcard, shifted to cloud-based and NFC mobile wallet technologies, the SMS based payments essentially were pushed out of the market (Digitaltransactions.net website).

At a glance, the US market seems primed for adoption of MPPs. The US has been a leader in the wide-spread use of smartphone technology (Shin et al., 2014). By December, 2014, there were 355.4 million mobile phone subscribers, and the wireless penetration rate was 110% (ctia.org website). The number of smartphone device users in the US indicates that if consumers convert to MPPs, the market is large enough to support this segment of transactions and to make MPPs competitive with traditional payment methods.

In reality, the spread of MPP technology and acceptance has been slow. (Pope et al., 2011) MPP-ready, or NFC-enabled, POS terminals are not prevalent in the US which has proven a significant limiting factor in consumer adoption (Contini & Crowe, 2011). US Consumers have little experience or interest with MPP services (Contini & Crowe, 2011) and many efficient and safe payment choices readily available to them, such as credit cards, debit cards, and cash, obviating the need for an alternate payment method (Pope et al., 2011). M-payments, therefore, must demonstrate a clear and pervasive added value in order to convert users from already existing payment methods (Pope et al., 2011). Based on a survey the Federal Reserve conducted in 2014, there is only a modest interest in using mobile phones to pay for purchases in store. Only 15% of respondents were likely and just 6% were very likely to use a mobile POS payment if offered by a merchant. Mobile payments are also disproportionately used by younger consumers: consumers aged 18-29 account for 36% of all mobile phone users. Even so, 62% percent of these young consumers indicated that they had no interest in using mobile payments (Federal Reserve website, 2014). Additionally, stakeholders have generally been skeptical about consumers' concern for security in MPP transactions (Global Mobile Payment Methods website).

While there is a dichotomy in the US between Apple and Android devices, the MPP market in the US has recently been stirred with the launch of Apple Pay. Considered a leading technology innovator, Apple helped put MPPs in the news with the introduction of Apple Pay and the iPhone 6. To use Apple Pay, a user rests her finger on the TouchID sensor and holds the phone over a MPP terminal. The iPhone authenticates the fingerprint and processes the payment immediately. Apple Pay uses a tokenized verification process on an embedded secure element. Apple earns a small percentage of each transaction from the banks because of the reduced risk of fraud. Credit card companies consider the technology to be a "credit-card present"

transaction - which allows for reduced fees to the merchant (Raffo, 2015). Consumers seem most comfortable with using Apple Pay on small to medium purchases. Additionally, consumers are limited by the number of merchants who accept Apple Pay (Sidel, 2014). There are no current rewards programs linked to ApplePay, but there are some expected to be included in the iOS 9 on supported payment terminals (About Apple Pay from Apple.com).

For the Android mobile payment system, Google introduced an NFC technology in 2011 (Shin et al, 2014) for its Google Wallet application, an app developed long before Apple Pay. The Google Wallet business model was built around targeted advertising, developed by gathering user data (Crowe et al., 2013). Google intended for Google Wallet to include a closed-loop advertising system to improve the targeting of digital ads, but this concept never came to fruition, as Google and the firms involved could not agree to a suitable revenue sharing agreement (Barr et al., 2015).

In early 2015, Google acquired technology from Softcard, formerly known as ISIS (Bolluyt, 2015). This technology stores credit card data on the user's SIM card, rather than using tokenization like Apple Pay (Bolluyt, 2015). Softcard was created to compete with Google Wallet in a combined effort of the telecom companies AT&T, Verizon Wireless, and T-Mobile (Crowe et al., 2013), but failed to gain adoption among consumers (Barr et al., 2015). Soon after the acquisition of Softcard, Google disabled Google Wallet and announced the revamping of Google's mobile wallet as Android Pay (Bolluyt, 2015).

Android Pay operates in a way similar to Apple Pay. A user unlocks the phone, then simply taps the phone on the terminal and goes. Android Pay also uses NFC hardware along with tokenization and biometric authentication, similar to Apple Pay's protocol (Bolluyt, 2015). When used at select merchants, loyalty points will automatically be added. There is also a "Save to Android Pay" function which allows consumers shopping online to save loyalty points, online discounts, and gift cards to their mobile phones for use in-store ("Android Pay" from Google's website).

As the handset manufacturers and OS developers, Apple, Google, and Samsung are in a prime position to drive the technology movement behind MPPs in the US. Additionally, credit card companies may also be able to monetize the MPP movement. Visa and MasterCard initially led the NFC movement with payWave and PayPass, respectively with mobile versions of these payment cards rolled out in 2008 (S. Clark, "MasterCard"). While NFC technology was used to transmit the credit card data, in lieu of the magnetic strip technology, the transaction was processed as a traditional credit card payment. This proximity initiative from these credit card companies was not to reduce fraud in the processing cycle, but to reduce risk of credit card cloning or counterfeiting (MasterCard.com). A year after launching PayPass Wallet Services, MasterCard revamped the service as MasterPass, focusing on online shopping, (Velazco) and keeping stride with the shift to mobile by leaving the proximity payment transaction with MasterCard to be incorporated into Google Wallet (and thereafter, Apple Pay and Android Pay) ("MasterCard Consumers").

A recent important development in the payment processing in the US has been the introduction of "liability shift". This movement mandates the merchants to upgrade their payment terminals to accept EMV or the "chip-and-PIN" payment method that is more secure than the magnetic stripes based system because of the use of tokens and SET (Crowe et al., 2013). The deadline for the upgrade was set as October 15 of this year. Failure to upgrade the related technology results in a shift of liability to the merchants for fraud related expenses. Banks and cards issuers are opting to replace magnetic stripe cards with EMV chip cards, to reduce their own risk as the weakest link in the transaction chain. Ultimately, the liability falls on the party using the least secure technology. However, if all parties involved have upgraded their technology, the liability is still carried by the credit card company, as had been the status quo (Mitchell, 2014). With the liability shift, the infrastructure for card transactions will inherently be more secure and reduce fraud opportunities present in the current mag-stripe environment, including skimming and counterfeit card production (Contini and Crowe, 2011).

The liability shift is important to MPPs because it is encouraging upgrades in the existing infrastructure, specifically POS terminals (Raffo, 2015). Presently, it is difficult to purchase a new terminal that does not have NFC capabilities, whether the merchant is interested in that technological offering or not. While the hardware upgrades do not inherently mean that merchants will accept MPPs, it does mean that they now would have the capability if they choose to activate the NFC functionality.

As the major players like Apple, Google, and Samsung release new products and improve existing services, as infrastructure is upgraded with EMV compliance, and as merchants find ways to increase revenues through MPPs, the US will see the groundwork laid for potential use of MPPs and widespread adoption. However, consumers still do not have an incentive to use MPPs over their familiar payment modes (Crowe & Contini, 2011). There are additional factors, outlined below in our 7C's framework, that may create additional value for consumers and affect the MPP movement in the US.

Culture: The advantages of the US market are many: highly developed and cost-efficient telecommunications, a diverse financial services infrastructure, and a population interested in and willing to respond to innovation. America is the home of technological innovation, and average household expenditure is more than \$33,000 per annum. Yet, the MPP readiness for the US market has been ranked low by the study conducted by MasterCard (MasterCard, Mobile Payment readiness index). This can be largely attributed to a demographic disconnect. In terms of usage, familiarity, and willingness, the US population skews towards male, young, and affluent. It's the latter two that are the issue. The affluent have lots of disposable income, but how many of them are young? And if the youth are ready to use MPP, does their income match their willingness to spend enough so as to create a viable market for MPPs (MasterCard, Mobile Payment readiness index)?

Consumer awareness has been a barrier for the adoption of MPPs in the US. As recent as 2011, most consumers were unaware that MPPs were even a payment option (Contini & Crowe, 2011). This has started to change with Apple's marketing campaigns which highlight the availability of Apple Pay on the iPhone and Apple Watch. Consumers still face the challenge

of determining which merchants accept this new payment format. MasterCard has designed another app specifically for this purpose, MasterCard nearby, to help consumers find merchants nearby who accept MasterCard contactless payments, including Apple Pay and presumably Android Pay (MasterCard Consumers Forum).

MPPs are generally viewed by the public as less secure than traditional card transactions. Security and privacy are reportedly of the utmost concern to consumers. However, consumer behavior is not consistent with the reported concern for safety, specifically consumer use of social media, poor utilization of safeguards (like device locks, PINs and passwords), and risky behavior such as opening spam emails. The belief that MPPs are less secure than actions the average consumer is regularly taking can be attributed to the consumer's lack of understanding of MPP technology. In fact, MPPs offers added layers of security, above those of the EMV chip-and-PIN card, through password protections and biometric security protocols (Contini & Crowe, 2011).

The abundance of payment options, for both retailers and consumers, has also stifled the deployment of new payment technologies in the US. Generally a leader in technology innovation, when it comes to banking, evidence has shown that US consumers prefer traditional methods over new technology and e-banking. Jang et al. (2009) attributed this largely to low awareness and understanding of the new technology, especially security concerns as well as the fear of changing the existing habit.

Cost: The cost for merchant's upgrading has already been addressed in the discussion about liability shift. Since MPPs are considered "card-present" transactions there are no additional cost for the merchant to accept MPPs, at least not from Apple at present (About Apple Pay from Apple.com). At this point, there is no additional cost for consumers to use MPPs, aside from the investment in a smart device and the associated wireless plan, which most consumers purchase regardless of intent to utilize MPPs. Consumers may see some cost savings in the form of promotional coupons attained through their MPP provider. Financial institutions and card issuers may see reduced costs by offering electronic downloads in the lieu of plastic card distribution (Contini and Crowe 22), providing incentives for these stakeholders to move MPP forward more aggressively.

Convenience: Credit cards are currently the most prevalent method of all the available payment options. Choices like ApplePay and Google Wallet have yet to show superior convenience to traditional cards (howtogeek.com). However, in recent deployment of chip and pin based credit card transactions in select US retailers (e.g. Trader Joe's, Walmart) the process is viewed as cumbersome and slow with steps that customers deem unnecessary (Masunga, 2015). The added friction of chip and pin transactions may drive the consumers towards MPP, particularly the tap-and-go format, that is easier and faster than using the card.

MPPs tend to replace small cash transactions, in transit fares or at vending machines, (Lee et al., 2004) but don't seem to reduce friction in these micro-payment experiences, when compared to incumbent payment methods. There may be a minimal increase in convenience, if consumers forget their wallets when they leave home, but this is not enough of a benefit to truly drive adoption. There is potential for MPPs to be combined with "self-checkout" applications, where the phone is used to scan barcodes for checkout, but these applications are only just emerging and are yet to be popular (Contini & Crowe, 2011). Additionally, the convenience of NFC technology, particularly the tap-and-go format, other non-retailer and non-banking applications such as transit and healthcare can drive MPP but this has only been implemented in the most basic levels in US transit and not yet proven to be a driver towards increased MPP use.

In recent years, mobile POS systems have made the acceptance of credit cards easier for merchants. POS applications, like Square and PayPal Here, have allowed merchants to accept credit cards with their mobile phones and 3G connectivity. Square comes with a free card-swiper that is inserted in the earphone jack of the mobile phone. Given Square's comparatively low processing rates and quick fund clearing, Square made credit cards acceptance more feasible for small, independent retailers and non-traditional merchants alike. Square has announced a new reader made for NFC and EMV chip cards. While the reader will retail for \$49, Square is offering a full rebate to qualifying merchants who register in advance ("NFC Reader for Apple Pay"). Services like Square make accepting credit card payments outside brick-and-mortar stores, at trade shows, farmers markets, or festivals, more convenient. Given the added function of contactless payments, it will become increasingly simple and economic for even the smallest of merchants to accept MPPs.

Continuity: In the US, there is little room for MPPs to enhance the consumer's daily lifestyle (Shin et al., 2014). Consumers do not rely heavily on public transit, so mobile ticketing has not proven advantageous. As mentioned, consumers do not face friction with convenience purchases and micro-payments, as they are already using credit cards over cash. Other opportunities to incorporate mobile proximity transactions into the consumer's daily routine exist, such as parking, gym memberships, and facility access, but these have yet to be realized in the US within MPP applications. In an interview, Marianne Crowe discussed how MPP can become part of the consumer's daily habit, "you may see a shift with consumers, particularly Apple consumers, who get comfortable using their phones. You have to build this habit. When you can get somebody to get this repeat payment for coffee, or any regular day expense like transit, if you can get them to use that type of payment more than three times and get them to come back and keep using that, then they develop a habit," (Crowe).

Consolidation: Consumers want different payment options, but they also want to consolidate different cards, like store loyalty, rewards, and payment cards (Contini & Crowe, 2011). The mobile (or digital) wallet could help with consumer

consolidation but it needs to offer all the functionality of a physical wallet: to carry a broad selection of payment methods, to support loyalty programs, and to interface with a wide range of networks (Contini and Crowe, 2011; Crowe et al., 2013). The major players in the US market (Apple Pay, Android Pay, and Samsung Pay) have not yet offered a mobile wallet solution with this complete, versatile functionality. Apple Pay and Android Pay are compatible with most major US credit card brands but each is constrained by operating partnerships with select financial institutions (Contini & Crowe, 2011).

Control: While mobile payment solutions, like Apple Pay, are not inherently offering budgeting or tracking options, partnering financial institutions are encouraging consumers to use their cards with MPPs as well as with their mobile banking apps to control spending and monitor card activity. Mobile banking apps have been available in the US for years, but by integrating MPPs, these applications now offer real-time monitoring and integrate the authentication of MPPs, for example, Touch ID with Apple Pay (“Citi and Apple Pay”). There are also a number of budgeting applications; similar to desktop budgeting software. Apps like Mint and Mvelopes link to user’s bank and credit accounts, regularly syncing with the latest transactions. These apps focus on a balanced budget; and do not integrate MPPs or offer real-time monitoring. There remains an opportunity for a single mobile payment solution to offer budgeting and spending controls across various cards, as well as intelligent card selections. With the later, consumers would not need to choose which card to use for what purchases, but the application would chose the “best” card based on card rewards, such as cashback points or airline miles, and/or based on user preferences.

Coupons and CRM: Mobile proximity payments can allow the consumer to use coupons as a part of the payment transaction, rather than keeping track of paper coupons, digital coupons, or promo codes in emails. Apps like Groupon offer this feature. As mentioned previously, Android Pay will offer “Save to Android Pay” functionality and Apple intends to incorporate coupons with iOS 9. Starbucks has a proven use-case for MPPs through the use of coupon, convenience and CRM. The success of Starbucks mobile payment system can be attributed to its pre-existing rewards program, strong loyalty base, and customer disposition to using gift cards; three factors which make it difficult for other retailers to compete (Roemmele, 2015).

Coupons and CRM incentives are not limited to the retailers only. Financial Institutions are also offering incentives for customers to use their card over the competitor’s cards. For example, after a Citibank consumer purchases a product, the bank will search for a better price on the same product within the last 60 days, and refund the customer the difference (“Price Check, Compare, and Rewind”). MasterCard, in line with its “priceless” ad campaign, offers Priceless Surprises: customers are randomly rewarded with gifts such as private concerts, Grammy VIP tickets, and Yankee’s baseball seat upgrades (“Priceless Surprises”). Credit card companies and financial institutions are offering rewards programs for MPPs to increase increased use. It is possible that credit card companies will also see a reduction in fraud-related expenses through the increased use of MPPs, coupled with the EMV shift (Crowe et al., 2013).

Mobile proximity payments present an opportunity to collect additional customer data, including preferences in buying habits tied to mobile transactions with promotions and rewards (Contini & Crowe, 2011). The ability to collect this information is not only valuable to merchants who want to create individual, targeted, marketing campaigns, but also to other stakeholders who want to improve the customer’s experience and build loyalty. Financial institutions, credit card companies, mobile network operators, and payment service providers all stand to benefit from the collection of this consumer data, if they can leverage it (Crowe et al., 2013). Given the overlapping interests of these stakeholders and the nature of the MPP ecosystem, there is potential for conflict over the ownership of this data and its use, as well as concerns for consumer privacy concerning protection and sharing of the data.

US Conclusion: There are an abundance of payment options in the US. While these options continue to grow, the older methods may be viewed as obsolete, but they are not excluded (Contini & Crowe, 2011). We have seen the implementation of proximity payment options, such as VISA Paywave and MasterCard Paypass, and in the last year, mobile proximity payments with Apple Pay, Samsung Pay and Android Pay.

With the launch of Apple Pay, there has been a lot of buzz in the media surrounding the potential future of mobile proximity payments in the United States and the opportunity for MPPs to replace, or at least directly compete with, traditional payment methods like cash or cards. Apple Pay may seem novel in the US, but MPPs have been steadily growing in popularity overseas in countries like Japan and Korea over the past decade (Hayashi, 2012). MPPs in the US have lagged behind due to the lack of POS terminals accepting MPP technology.

Another reason for the slow growth of MPPs is the individual interests of the various stakeholders (Crowe et al., 2013). A single driving leader has yet to take the lead in this moment; Apple has only emerged as a leader in the last year. With Apple’s tendency to be a technology leader in the US, and anticipating that MPPs will catch up with consumers, Google and Samsung have followed suit with their own comparable MPP options. However, the success of all these MPP initiatives will largely depend upon an increase in consumer demand.

Convenience and continuity are unlikely to be integral drivers in the US, as the opportunity for added value through these channels is small. There is great potential for consolidation and control to drive adoption, but this potential will remain limited until the applications for MPPs are integrated into a wholly functional, single MPP solution. The most substantial driver for the US will likely be coupons and CRM related offers that will push the MPP to the mass market acceptance.

6.2 South Korea

Although mobile payments are still an emergent technology within the United States, South Korea has been utilizing mobile, contactless payments since late 2002 ("NFC Country Profile"). The initial proximity payment programs were called Moneta and K-merce, and were launched by the two largest Korean mobile carriers, SK Telecom and KT, respectively (Bradford, 2013). The systems utilized infrared technology and were generally viewed as failures. The programs were inconvenient to use, POS readers lacked interoperability between mobile carriers, and mobile carriers didn't have buy-in from the banks and credit card companies.

LG Telecom, the third-largest mobile carrier in South Korea, recognized the necessity of cooperation within the banking system and partnered with Kookmin Bank, the largest bank in South Korea, in 2003 to create BankOn, an Integrated Circuit (IC) chip-based mobile banking service (Bradford, 2013). This service didn't offer mobile proximity payments, but instead allowed users to use their phones in lieu of banking cards at participating ATMs for withdrawing cash (although payments could only be withdrawn from Kookmin Bank accounts). The service was a success, and soon after, all the major mobile carriers were offering similar services.

Visa and MasterCard entered the Korean market in early 2006 with Wave and PayPass respectively. These services utilized SIM-sized credit cards that could be inserted into phones. This method was less-than-ideal because if users wanted to use multiple cards, they were required to manually switch out the cards within their personal devices. SK Telecom overcame this inconvenience a year later by offering credit card applications which could be downloaded to an actual SIM card. The other large mobile networks quickly followed suit. By 2009, roughly four million Koreans were using their mobile phones to make contactless payments, although 12 million phones had the technology to do so (ITIF).

In August 2015 Samsung Pay announced its newest bid in the MPP arena. It acquired LoopPay for 250 million US dollars earlier in the same year in order to exploit LoopPay's MST (Magnetic Secure Transmission) technology as a potential game changer in the field (Del Rey, 2015). This new MPP hardware uses the magnetic card reader on legacy POS systems to transmit payment data from the phone, eliminating the need for terminal upgrades. Samsung Pay also uses tokenization, the same way as Apple Pay, in lieu of storing account information on the phone (Bolluyt, 2015). This new offering is still in the beta stages of testing, but should remove the hurdle of cost for merchants in the MPP adoption equation. However, it shifts the cost to the device manufacturer who must have a deep pocket to develop and experiment with MPP supportive technology as exemplified by Samsung's acquisition of LoopPay.

Integral to the South Korean adoption of proximity payments was the public-private launch of T-Money in 2004. T-Money is a contactless payment card system created for use within the public transportation system. The cards are embedded with IC chips and initially came as pre-paid cards but now offer the option for post-paid transactions as well. They can be used on the metro, city busses, taxicabs, and in participating convenience stores and vending machines throughout South Korea. The service was initiated by Korea Smart Card Co. Ltd, which is co-owned by the Seoul Metropolitan City Government, LG CNS, and by Credit Card Union ("About Us: T-money World").

In Japan and South Korea, mobile payments using RFID were introduced in conjunction with contactless cards because they were ideally suited for mass transit. Japanese and South Korean commuters quickly adopted this technology (Hayashi, 2012). Implementing proximity transactions in transportation supported the expansion of proximity payment infrastructure, creating an opportunity for the use of MPPs and introducing MPPs into the consumer's daily lifestyle. This served as a catalyst to break the "chicken or the egg" cycle that otherwise inhibits MPP adoption.

Culture: The tech-savvy nature of Korean consumers and their familiarity with proximity payments, through T-Money and the public transit system, makes it seem like South Korea should be embracing MPPs. Unfortunately, the Korean culture has similar negating effects to the US when applied to the adoption of MPPs. There is a plethora of payment options, so MPPs don't solve any pressing payment issues.

In sharp contrast to the US, Koreans are a homogenous and collectivist society. They like to follow trends and trust the endorsements of public figures. Celebrity endorsements are one of the keys to initiating shifts in behavior. For this reason, consumer education could advance the adoption of mobile payments, particularly, if it is discussed on popular blogs or television shows.

In the past, South Korea has seen many cases of financial hacking. This has led South Korea to adopt some of the toughest security laws in the developed world. There are many different aspects to mobile security: access, device, platform, data, and the cloud. Communication providers, like SK and KT, need to provide end-to-end security capabilities. MPP technology is more secure than traditional magnetic strip credit cards, but Korean users perceive the technology as less secure. This may be because, up until the present, they have had little incentive to use or study the security of MPPs (Oh, 2015).

Cost: In Korea, the transportation network is managed primarily by Seoul Metro. The issue of cost was, therefore, handled by governmental involvement in the project, removing the concerns typically faced by private companies about a timely ROI and that led to the success of the T-Money project. It is very hard for the private companies to make money in this sector because they have no control over ticket prices and therefore find it difficult to make a profit by offering mobile proximity ticketing solutions. KT tried by offering automatic top-ups to commuter pre-paid ticket accounts, but consumers do not see the value of the service: it is simple for travelers to recharge their accounts at kiosks located around the city, at most convenience stores, and at transportation terminals. Instead KT charges an activation fee for its MPP ticketing service, Olleh Touch, which requires a T-money USIM card to be present in the mobile device.

For retail applications, there are many costs for Korean merchants to consider when deciding whether or not to accept MPPs. Besides paying for terminals upgrades, there is a cost associated with educating consumers about the benefits of using MPPs. Marketing through MPP apps is another cost that needs to be weighed against an ROI that is difficult to predict because of consumers lack of demand for MPPs. There also can be additional transaction fees at MPP terminals, above the fees that credit card companies already charge.

Card issuing financial institutions can absorb some of the adoption cost because they have the potential to save on costs by no longer needing to issue physical cards. Unfortunately, banks are reluctant to issue only mobile cards (without physical cards) because they want to perpetuate the feeling of status that consumers report when they show their cards during transactions. In particular, platinum, gold, or other elite memberships offer consumers a status symbol that banks don't believe will be as valuable when tucked away in a mobile app (Oh, 2015).

Convenience: Similar to Japan, Korea's proximity based transit system was a success because it solved a need in the daily lives of commuters. In fact, the only successful proximity payment to date, in any nation, has been in the form of transportation payments. This success shows that convenience is one of the main drivers of MPP adoption.

By law, credit card numbers cannot be stored, online or in mobile transactions in South Korea, so consumers have to enter their card numbers every time they wish to make an online purchase, making digital commerce cumbersome for the user. Credit card numbers can only be stored in secure elements, like tokens, which can make MPPs more attractive in South Korea from a convenience perspective (Oh, 2015). Still, MPPs do not directly solve any immediate payment needs for consumers. Although eCommerce is mildly inconvenient to South Korean consumers because of the need to re-enter credit card information, it is still popular, indicating that an increase in convenience by removing the need to enter credit card information will not add critical value. South Koreans are also comfortable switching between cash and cards to make payments and, thus far, the added convenience of utilizing MPPs has not been demonstrated well enough to consumers to encourage mass adoption. There may still be hope if MPPs can be integrated into the already popular T-Money system.

Continuity: The nationwide T-Money infrastructure has made proximity payments a part of the daily life of the Korean commuter. It is integrated into the flow of their day and practically eliminates friction from the ticketing process.

KT has attempted to increase market value by focusing on continuity through smart posters. Consumers can hold up their phones to a smart poster and conduct a myriad of transactions, depending on the poster. Some example uses include purchasing movie tickets, downloading transit information, and paying for parking (Oh, 2015). The results of these efforts have yet to be determined in market studies.

Consolidation: KT has offered the MoCa wallet, a mobile wallet that incorporates all of a user's memberships, coupons, and credit cards into one app. All of the MoCa functionalities are centered around USIM and NFC technology with the ability to accept Bluetooth advertisements. The benefit to the merchant is purported to be an increase in consumer loyalty program participation, but not enough merchants have found this service valuable, and in turn, the consumers are not getting the full benefits from the application and interest are waning. Additionally, the consolidation service must be simple and must fit the existing transaction habits of the consumers. K-MERS, the precursor to Apple Pay launched in 2002 with the consolidation of many consumer services, such as banking, stock trading, shopping, and coupons failed to gain mass adoption. The business model required a change in consumer behavior and was not specialized enough (it offered too many services). Additionally, the ecosystem at that time wasn't supportive of the technology (Oh, 2015).

Control: Control, in the forms of spending limits and immediate notification of expenses and charges, did not seem to be an active driver of consumer adoption of MPP in South Korea.

Coupons: There is a strong coupon culture in South Korea. The MoCa Wallet, offered by KT offers geofencing, allowing merchants and advertisers to know when a customer enters a certain access point, such as the storefront. The merchant can then push Bluetooth notifications to the user about personalized deals or new product arrivals. In Korea, the knowledge of new arrivals has had a particular appeal among female consumers (Oh, 2015). Major chains, like Shinsegae Department Stores and Malls were quick to adopt the service, showcasing its appeal to merchants and customers alike (S. Clark "New Korean Mobile Wallet Service").

T-money also exemplified the positive effect of coupons on South Korean payment adoption. T-Money fares are 100 Won (about 0.08 US dollars) cheaper than paying with cash or single-use tickets, and that may have played a role in the pervasive adoption of the T-Money ticketing solution.

S. Korea Conclusion: The current MPP ecosystem in Korea is ripe for mass adoption. Korean consumers have already developed a habit of utilizing proximity payments in public transportation, making adoption more seamless and making the transition less of a dramatic change to the daily norm. The new Samsung Pay technology removes the cost burden for merchants removing one of the major barriers faced by other nations.

Still, the ecosystem won't flourish without a viable business proposition and a strong leader, be it in the private or public sector. The governmental support and oversight, paired with the joint-efforts of private sector companies was instrumental in

the successful implementation of the T-money ticketing system. Perhaps a second effort of this magnitude will be required to fully realize the potential of MPPs in South Korea.

6.3 Japan

In the last decade, Japan has been the pioneer in development and use of mobile phones for daily activities. This early adoption of mobile phones allowed Japan to make large strides towards the widespread use of mobile proximity payments. Proximity technology was first seen in 1990 when Sony's FeliCa technology, a contactless NFC integrated-circuit card, in the form of plastic "swipe cards" was exported to Hong Kong. There it served as the new train ticketing solution, known as Octopus (Thompson, 2014). Japan followed suit shortly after seeing the success of Octopus in Hong Kong. In 2001, JR East deployed FeliCa in the form of Suica, a prepaid transit card, in the railway network serving the Tokyo region (Hara, 2004). Mobile payments evolved concurrent with the increased use of contactless transit ticketing. Mobile payments were first introduced by NTT DoCoMo in 1999 with Smart Money and i-mode (Henten, 2015).

In 2005, NTT DoCoMo, Sony, and East Japan Railways combined efforts to form FeliCa Networks, creating a hybrid solution: a mobile FeliCa chip, (Hara, 2004) that combined NTT's i-mode payment solutions, Sony's FeliCa proximity technology, and JR East's Suica ticketing (Tsukioka, 2005). The mobile chip, through Suica's smart card service, allowed users to check and re-load fares, buy commuter passes, perform the traditional contactless Suica card ticket functions, and make small purchases all from their mobile phones (Poupee, 2014).

The component companies of FeliCa Networks each contributed to the adoption of mobile proximity transactions. JR East turnstiles already complied with the FeliCa standards, Sony incorporated the FeliCa hardware into its mobile handsets (ABI Research, 2006), and NTT DoCoMo subsidized the cost of the hardware for merchants. In turn, merchants paid a fee to FeliCa Networks, typically between one and four percent of each FeliCa transaction (Crowe et al., 2010). With the vested interest of all its counterparts, the presence of FeliCa technology spread rapidly throughout Japan. FeliCa based terminals have been placed in over one million locations (Paypers, 2014). The relationships between various stakeholders, especially those comprising FeliCa Networks, has been key in developing the mobile proximity ecosystem in Japan (Thompson, 2014) and offers a good lesson to guide the adoption of MPPs.

In 2003, NTT DoCoMo developed a mobile wallet, 'Osaifu-Keitai' with varying functionality, including credit, prepaid, and transit cards (ABI Research, 2006) and keys (Hara, 2004). In just one year from the launch of the Osaifu-Keitai, NTT DoCoMo proved very successful in penetrating the market, with 20 million subscribers equipped for mobile wallet payments and 1.5 million having activated this functionality (Ondrus & Pigneur, 2007). According to Masao Nakamura, ex-CEO of NTT DoCoMo, "the mobile phone [is] the key to daily life." He believed mobile payments and Osaifu-Keitai were potentially a many-trillion yen (many-billion US dollar) opportunity for NTT ("NTT DoCoMo Annual Report to Shareholders", 2006). As of 2013, Osaifu-Keitai technology was present in over 65 million phones in Japan. However, only about half of those were registered for use and this segment of active users accounted for only about 20% of e-money cards ("Death of Cash", 2013).

Culture: Japan has a relatively huge mobile subscriber base and this has been a success factor in MPP adoption (Deloitte, 2014). As of March 2015, there were an estimated 148 million mobile subscribers in Japan (TCA) which translates to 12 subscribers for every 10 people ("World Development Indicators"). Almost half of the mobile subscribers have NFC-enabled phones: over 70 million compared to the roughly three million present in the US (Paypers, 2014).

The majority of the population on the island country of Japan lives in densely urban city centers. The general population is homogenous, well-educated, and tech-savvy (Thompson, 2014). Purchasing is highly cash-driven, although credit cards have been used for over 50 years and the average consumer owns two cards.

Two of the factors driving MPP adoption in Japan have been its geographical isolation, commonly referred to as "Galapagos Syndrome," and its highly developed mobile infrastructure from proximity transactions. The Galapagos Syndrome has allowed Japan to evolve semi-independently from the rest of the major continents and create its own standards in MPP. Japan uses Type C NFC ("About FeliCa") in the form of FeliCa, in contrast to the more recent type A/B, which are being deployed around the world (Deloitte Report, 2014). Additionally, the public trusted the FeliCa technology because it was launched by reputable and trusted Japanese companies, NTT DoCoMo and Sony.

Thus far, global manufacturers have catered to Japan's needs by manufacturing phones specifically for Japan. Android phones available in Japan have the FeliCa chip, while Android phones elsewhere use Type A/B NFC. As other manufacturers enter the global market with new products, and conform to global standards, Japanese manufacturers and service providers may need to look towards Type A/B compatibility, if there is to be hope of expanding beyond the domestic market. In line with the Galapagos Syndrome, Japanese businesses do not typically prioritize the international market over their own, (Thompson, 2014) but this may become necessary as the MPP landscape continues to change. Conversely, given the strong presence of FeliCa infrastructure, it will be difficult for other players, such as Apple Pay, to enter Japan without conforming to the standards of the local market.

Compared to the average consumer worldwide, Japanese consumers are more familiar with mobile proximity payments (20% over 11.3%, MasterCard research). However, there remains a gap between awareness and willingness to use the technology; the Japanese are less willing to use mobile devices for payments and remain cash-inclined. This gap between consumer willingness to use MPPs and their familiarity with the concept is a key barrier that needs to be overcome before measurable adoption can take place. Consumer education about the benefits of mobile payments is a necessary starting point ("MasterCard mobile readiness index", 2014).

Cost: A key factor in breaking the “chicken or the egg” cycle of mobile proximity payment adoption is establishing a revenue model for the stakeholders. NTT DoCoMo was able to invest in the infrastructure to expand mobile proximity payments because that investment also created opportunities for revenue. As a partner in FeliCa Networks, NTT DoCoMo received revenue share from the licensing fees of the FeliCa chip to other handset manufacturers. In addition, merchants paid a fee of 1-4% to FeliCa Networks in order to receive the e-money payments. NTT DoCoMo purchased a bank in order to enter the credit-business and earn revenue from post-paid in addition to prepaid e-money. NTT DoCoMo also offered fee-based services, like loyalty programs, to merchants (Crowe et al., 2010). On the other hand, NTT DoCoMo invested in the success of mobile proximity payments by subsidizing the cost of merchant terminals. They also developed Osaifu-Keitai, which offered consolidation and convenience to consumers, and made it available to both consumers and other MNOs free of charge.

In Japan, many merchants have multiple terminals: one for Suica and Edy, subsidized by NTT DoCoMo, and another for credit card payments. Brick-and-mortar credit card terminals cost around \$300 each, while a terminal with wireless network access, such as those used by taxi cab drivers, costs \$700-\$1000. In some cases, the merchant may use Square for Visa, MasterCard, and American Express, because the card swiper is cheaper than a terminal, but merchants still require another separate terminal to accept JCB cards, one of the most popular brands of credit card in Japan. Merchants may require yet another terminal, to accept Type A/B NFC proximity payments, should the global standard become a factor. Merchants, therefore, face a significant cost for changing and maintaining their payment terminals. Subsidies from a big player like NTT DoCoMo help to defray that cost and move MPP adoption forward. Additionally, merchants may save by using MPPs over traditional credit cards as the fees are lower (Masuda, 2015). Merchant credit cards fees, compared to the US, are very high in Japan ranging from 6-8% depending on the type and size of the merchant (Yamamoto, 2015).

While the costs of accepting mobile proximity payments can be a barrier for many merchants, the investment in FeliCa turnstiles for JR East was not an obstacle. Upgrading the turnstiles improved efficiency in the stations, increasing the flow of traffic and making a better user-experience. By decreasing the number of paper tickets used, it potentially reduced the costs of maintaining many moving parts. JR East also has the freedom to increase fares to offset upgrades and maintenance (Masuda, 2015).

Convenience: The success of mobile proximity transactions is directly tied to the execution of FeliCa in the transit system (ABI Research, 2006). As of 2013, 17.1 million people were using the JR East lines each day (JR-East). This infrastructure has made MPPs a part of daily life, integrated into the regular flow, practically eliminating friction from the ticketing process.

Continuity: The FeliCa technology integrates seamlessly into the commuting consumer’s daily flow. Turnstiles in the JR East stations default to open, minimizing friction when entering the stations. The FeliCa contactless transaction is completed in approximately one millisecond (“About FeliCa”, Sony website). The speed of this transaction is essential to the successful adoption of proximity ticketing, the Suica cards (and in turn, Suica mobile). FeliCa doesn’t require the user to open an app, or even turn the phone on.

Other ticketing applications of FeliCa include SKiP Service by All Nippon Airways and Touch and Go by Japan Airlines. Both allow passengers to check in and board by waving their mobile devices over a ticketing reader. Additionally, both services convert earned mileage points to e-money, which can be used at many restaurants and stores in the airports (“About FeliCa”).

Many universities, colleges, and businesses are adopting FeliCa for identification and access control. It can also be used for making purchases at on-site cafeterias or commissaries and vending machines (“About FeliCa”, n.d.). Visiting Sony’s offices in Tokyo, we saw these mobile applications in use first-hand.

Consolidation: FeliCa and Osaifu-Keitai allow for the consolidation of multiple cards into a single mobile device, including transit cards, identification, e-money, and credit cards. However, Osaifu Keitai does not support applications specific to different retailers and for this reason, consolidation has not been fully realized in Japan. In lieu of Osaifu-Keitai, FeliCa Pocket combines loyalty cards and coupons into a single application for participating retailers.

Coupons: Using MPPs offers consumer benefits in the form of discounts and coupons. Suica users (including but not limited to Suica mobile users) receive exclusive discounts over normal paper tickets for upper class tickets and Shinkansen (bullet train) tickets.

Nanaco and WAON are two other brands of contactless prepaid e-money cards which can be used on the mobile device through Osaifu-Keitai at such popular chains as 7-Eleven convenience stores and Denny’s restaurants (“Taking Another Step Forward”, n.d.) and subsidiaries of the AEON Group, including supermarkets, specialty stores, and retail malls (“About Aeon”, n.d.). Both brands encourage use of their mobile e-money through push notifications and coupons.

On the merchant’s side, e-money and Osaifu-Keitai offer an opportunity to collect data about consumers, building their CRM base. Consumers must register in advance for both e-money and merchant loyalty program for Osaifu-Keitai, so merchants have access to demographic information about their customers, in addition to their purchasing habits.

Another form of advertising enabled by proximity technology is SuiPo, short for Suica Poster. These are Suica-enabled posters that can be found hanging in train stations throughout Japan. When the poster is scanned with the Suica card or Suica mobile, an email with additional details is sent directly to the user (MacManus, 2009).

Japan Conclusion: In Japan, the support of large companies, specifically the joint-venture FeliCa Networks, as well its parts, NTT DoCoMo, Sony and JR East, has been key in the widespread availability of FeliCa NFC technology and the opportunities to use MPPs in daily life. Introduced by applications in transit, as in South Korea, the Japanese have integrated proximity transactions into their daily flow, starting with mobile phones for transit, that later spread to convenience purchases and micro-payments. Japan has surpassed South Korea in the benefits available to consumers, offering additional consolidation through the mobile wallet, Osaifu Keitai.

With four of five C's driving consumer adoption (convenience, continuity, consolidation and coupon) and well-developed infrastructure, Japan's MPP environment seems relatively mature and well suited for consumer adoption. Despite the Japanese inclination to utilize new technology and above-average consumer awareness and knowledge of MPPs, Japan has not yet surpassed the cultural predisposition to prefer the use of cash. Additionally, as the global landscape of MPPs and international standards are converging around Type A/B NFC technology, Japan faces the challenge of growing an isolated FeliCa MPP ecosystem versus conforming existing technology to offer wider compatibility and interoperability.

6.4 China

China has the world's largest mobile subscriber base. According to the Ministry of Industry and Information Technology of China (MIIT), the number of mobile subscribers in China reached a total of 1.2 billion in October 2014. Put another way, the number of mobile subscribers in China are roughly three times as many as all the mobile subscribers in North America and more than the entire mobile subscriber base of Europe. At the same time, mobile broadband (3G and 4G) is developing robustly in China and the number of mobile broadband users totaled 539 million in October 2014 (MIIT website, 2015).

The current environment in China strongly supports the expansion of financial services, and consequently mobile payments, in rural and remote areas. The poor wired network infrastructure and the low proliferation of PCs in the countryside, together with the wide coverage of mobile networks and the high proliferation of mobile phones have made the countryside more conducive for the development of mobile payments (Raghav, 2013).

In 2013, remote mobile payment in China made up 93.1% of the national mobile payment market, while only 6.9% consisted of MPPs. Proximity payments based on NFC captured 0.8% of the market share (iResearch, 2014). The lack of NFC-enabled phones in China has proven to be an obstacle in the adoption of MPP. Thus, China's MPP industry seems to be in a nascent stage (at least relative to its neighbors – Japan and South Korea). However, its untapped yet vast potential is of considerable interest to a myriad of players who are attempting to assume "first-mover" advantage and jostle for a bigger piece of the pie (ABI Research, 2011).

In order to fully comprehend the MPP market in China, it is important to take a closer look at the key players in the ecosystem. Government oversight and control in China have created unique relationships among these players and provide values that differ from those observed in other countries discussed in this paper.

UnionPay has played a central role in the evolution of MPPs in China. Created under the auspices of the State Council (China's federal government) and the People's Bank of China (PBC), UnionPay was established in March 2002 as the national bankcard association. It operates an inter-bank transaction settlement system through which the linkages between banking systems are maintained. Thus, UnionPay links the ATMs of nearly 200 banks throughout China and essentially functions as an EFT-POS system. Consequently, it has a powerful advantage in fund clearance, settlements, and bankcard payment services. It also has strong control over POS devices and it is therefore much easier for UnionPay to standardize mobile POS devices in a cost-effective manner when compared to more capitalistic models with multiple players.

The key to accelerating the propagation of MPPs in China now is the creation of a well-organized integrated circuit (IC) card (card with the chip) application environment. An open and sound IC card application environment is critical for the development of NFC based mobile payments (Wang et al., 2012). From 2011 onwards, UnionPay, (along with commercial banks and other stakeholders) ensured that most POS devices of domestic merchants supported IC cards. The PBC also stipulated that all financial cards issued 2015 onwards must be IC cards. The issuance of financial IC cards has accelerated rapidly. By the end of 2014, over 1 billion IC cards were in issuance in Mainland China (UnionPay Handbook, 2015).

In 2011, UnionPay took a major step forward in facilitating the growth of MPPs by launching 'Quick Pass' - a pre-loaded IC smart card, by which cardholders were able to pay by waving their card in front of a contactless payment terminal. In August 2012, UnionPay and China Mobile partnered to fast-track the development of MPP in the country. As a part of this initiative, customers in 14 cities could now link their financial cards to NFC-enabled China Mobile smartphones. They could now utilize contactless mobile payments in shops, convenience stores, vending machines, and other places that displayed the logos of UnionPay's 'Quick Pass' and China Mobile's 'Mobile Phone Wallet' (Wang et al., 2012).

China's leading mobile carriers - China Mobile, China Telecom and China Unicom - have each established their own mobile payments subsidiaries. All three have strong mobile subscriber populations, control access to millions of mobile devices, and see mobile payments as an additional revenue stream. They are however, pursuing rather different paths. In May 2010, China Telecom and China Unicom aligned with UnionPay's 13.56 MHz standard, while China Mobile held out until late 2012 with its 2.4 GHz solution, until the switch to 13.56MHz was made mandatory. Furthermore, in 2011, China Mobile took a major step forward to acquire a 20% stake in the Shanghai Pudong Development Bank, with which it subsequently launched a mobile banking/payments platform.

Besides the aforementioned financial institutions and MNOs, Internet-based third-party payment providers (TPPs) are another major player in China's mobile payment industry. Prominent among them are Alipay and Tenpay, of the Alibaba and

Tencent groups respectively, who have made rapid strides, surging past financial institutions and operators with regards to

MPPs. Since Alipay became the first TPP in China in 2004, the TPP industry has grown to include over 300 players.

TPPs have made a more conservative foray into MPPs (as compared to remote payments), beginning with 2D barcode technology. In order to use this payment method, customers need to download the TPP's app. This allows a vendor to scan a TPP account holder's 2D barcode and push the payment amount to the customer's mobile device instantly. On seeing the bill and clicking 'confirm payment,' customers can transfer the money immediately. Customers can also scan a merchant's bar code in order to process a payment. For instance, taxi passengers in Beijing can use Alipay mobile to pay for their trip, simply by scanning the barcode of the taxi and pressing to confirm the payment.

In January 2013, Alipay mobile launched an innovative MPP product using sound-wave technology. Customers press a button to have their phone create white noise, which searches for other Alipay accounts around them to help identify their payee. Once they confirm the payee account and the payment amount, the transaction is completed in a matter of seconds. In April 2013, this technology was successfully used with vending machines in the Beijing subway and will eventually be piloted in markets outside of mainland China including Hong Kong, Taiwan, and Singapore (Xinhua Net, 2013).

Alipay Wallet has over 270 million active users, according to company statistics. More than 40,000 retail stores operating in China, including supermarket Carrefour, accept payment through the app. In May 2015, Walmart teamed up with Alipay Wallet to allow customers to make purchases via proximity payments in 25 of its stores in southern China. To facilitate this payment, in-store scanners will read barcodes in the Alipay mobile app (Borison, 2015).

Culture: In China, cash is king (Waldmeir & Rabinovitch, 2014). Low levels of street crime, coupled with poor social security policies have fostered a tendency to keep wealth close at hand. However, due to recent urbanization and government strategies to boost non-cash payments, use of bank cards has grown exponentially. In 2014, the PBC reported over 4 billion bank cards in circulation. While over 90% are debit cards (3.8 billion), credit card issuance also rose by 19% in 2013, and Euromonitor predicts credit card usage will grow faster than that of other cards over the next 5 years.

From a societal perspective, a study on Chinese readiness to adopt mobile payments found that consumers place a tremendous value on trust and social influence (or the approval and acceptance by peers in a trusted group) over technical factors such as perceived usability. These researchers also found that factors such as perceived social acceptance in personal networks and in society boosts consumer willingness to use mobile payments (Chong et al., 2012).

Cost: On an average, it costs UnionPay between 300-500 yuan (\$45-80) to upgrade a POS system that enables NFC payments (Salvacion, 2015). However, the lack of NFC-enabled phones does not make this an attractive proposition for the UnionPay to take on this expense. On the other hand, with merchants unwilling to take financial responsibility, the TPPs must bear the cost of POS terminals for their respective payment solutions (Di, 2015).

The cost of NFC-enabled smartphones remains prohibitive for the average Chinese consumer, which is why NFC-based proximity payment adoption hasn't really taken off in China. However, low-cost smartphones with powerful processors have been created by domestic manufacturers like Xiaomi, Oppo and Meizu, which in turn has brought mobile connectivity to groups of people and areas that wouldn't usually have had Internet access (Gokey, 2014).

Continuity: In many countries where MPPs have taken off, the transit system has been the primary channel of implementation. Similarly, transportation has been part of multiple pilot projects in China, particularly in major cities. On December 31 2010, China Unicom introduced its SIMpass NFC solution in Beijing with its primary application being the Beijing automatic fare collection system (AFCS), the largest transportation card system in the world (Mobile Payments World, 2013). This technology works with over 80% of handsets in the Chinese market, with customers having to simply replace their conventional SIM card with the new SIMpass card. The scope of China Unicom's payment solution encompasses not only buses and taxis in Beijing, but also over 2,000 businesses including the 'Park and Ride' car parks, supermarkets, fast-food stores, pharmacies, cinemas, parks, and public telephones. A subsequent version of this card, developed by Watchdata, instantly transforms a customer's handset into an NFC device. Thus, this SIMpass technology neatly circumvents the issue of low proliferation of NFC phones in China (Clark, 2012).

Additionally, China Telecom utilized the same technology to launch the mobile NFC version of the Yang Cheng Tong Card, for public transport and other local payments, in the Guangzhou and Foshan provinces in February 2011, and has since expanded this program to over 20 provinces in China (Brown, 2011).

Consolidation and Convenience: The biggest successes in the Chinese MPP industry this far, Alipay (which operates under Alibaba's finance arm Ant Financial) and Tenpay (of the Tencent group) have made it their mission to provide the end user with a plethora of services in addition to mobile payments. The goal is to create an integrated platform on a mobile client that will increase user stickiness and increase switching costs for consumers (Di, 2015).

When a user signs up for an Alipay account, they also get access to Alipay Wallet - a mobile wallet app that allows users to store and manage credit cards, gift cards, and discount coupons electronically. This mobile client provides a wide range of services including but not limited to, payments collection, mobile phone account top-up, lottery purchase, bar-code payment and charitable donations (Di, 2015). Significantly, in June 2013, Alipay launched Yu'e Bao - a money-managing fund that allows Alipay users to invest their money into an interest-bearing account. Yu'e Bao or "Save what's left," has, in its short lifespan, emerged as one of the world's biggest money-market funds. The offer is enticing - in contrast with traditional banks,

Yu'e Bao needs no minimum deposit, imposes no transaction fees, is mobile-friendly and, most crucially, provides depositors with a better return than the 3% average that Chinese state banks provide.

On the other hand, Tenpay seeks to combat Alipay's growing influence by pushing mobile payments through its extremely popular social app, WeChat. With 600 million monthly active users in Q2 2015, the company is successfully experimenting with the socializing, digitizing, and gamification of mobile payments (Trieu, 2014).

Coupons: With a proclivity toward saving, Chinese consumers are naturally geared towards finding the best deal. Hence, companies trying to break into the MPP industry find coupons necessary to incentivize users to use their products. For instance, when Alipay launched their payment solution for consumers, they eliminated the transaction fees traditionally imposed on non-cash payment (Di, 2015). Further, both Alipay and Tenpay, list available coupons for items provided by partner retailers. Once at the store, users can redeem coupons and complete their transaction using app-based MPPs.

China Conclusion: MPPs in China are currently at a critical juncture. On one hand, the Government has developed transparent mobile payment standards and policies aimed at nurturing a contactless payment culture. Further, across China, MPPs have been tried using a variety of technologies and diverse application channels. On the flipside however, multiple stakeholders with disparate interests have launched several of these pilot projects. Consequently, zeroing in on a business model that benefits everyone has proven difficult so far. While the TPPs are currently the most successful at MPP initiatives, widespread adoption of these payments in China will necessitate a lot more co-operation and less competition between the different stakeholders.

7. Final Discussion

There is no denying the potential reach of mobile payments. Smartphones are rapidly becoming the most ubiquitous electronic device on the planet and their influence is growing exponentially. With this study we have added to the available knowledge on mobile payments by identifying influencers and drivers of adoption of one particular type of mobile payment: - mobile proximity payment. From a practical perspective, our research has crucial implications for providers seeking to enter the proximity payments space. The two influencers - Cost and Culture - are region-specific and relatively uncontrollable and should be considered to determine whether market conditions are favorable for mobile payment proliferation. That being stated, the Cost influencer, which is often negative, can be largely overcome if a key player - for instance, a government body or large organization - takes initiative to subsidize the development of infrastructure and technology. On the other hand, the five drivers - Convenience, Continuity, Control, Consolidation and Coupon - are payment solution-specific factors and should be looked at more closely during the product development process.

One major limitation of our study is the need to test and confirm our model in additional markets that have varying levels of mobile infrastructure and payment sophistication. Therefore, one key area for future research would be to validate the 7Cs Model using empirical studies in different countries with diverse payment cultures and infrastructure. It would also be prudent to investigate and/or devise more viable revenue sharing models for the proximity payment industry.³

³ *References are not included to save space. Interested readers can contact the corresponding author for the details of the references used in the paper.*