Mobile Payments: Past, Present and Future

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Abstract: Mobile Banking and Payment systems are developing at a very fast pace. The first solutions of this kind are evidenced in 1997, and from that time until nowadays they have undergone a long evolutionary path. From today's point of view we can recognize three phases of Mobile Payment (MPayment) evolution: Phase 1 - Short messaging-based payment; Phase 2 - Payment using mobile Internet browser; and Phase 3 - Downloadable application-based payment. Each of those phases is interesting for some reason and fundamentally innovative. Each of them establishes a new type of relationship between bank or other payment service provider and their customers and therefore needs a new type of CRM to be developed, but also imposes new, always more dangerous threats and bigger worries. But, as we can expect, the MPayment development process will not stop here. Four evolutionary scenarios for the future can be imagined: (1) Credit carriers domination; (2) MPayments for the people; (3) MPayments … if we have to; and (4) New dogs, old tricks.

Key-Words: Mobile technologies, mobile banking, mobile payments, MPayments, evolution, future trends.

1 Introduction

Mobile payments (or MPayments) are already impacting the traditional landscape for transactions, but the disruptions have only just begun. While there is significant debate about how this market will evolve and who will emerge as winners and losers, there is little debate that the market will grow quickly. Multiple analyst forecasts predict that the MPayment global market will grow to between $600 billion and $1.3 trillion USD by 2017 [1, 2, 3].

Despite the uncertainty that remains about MPayments, key stakeholders such as retailers, financial institutions, brands and Web/social, and emerging technology players need to prepare themselves if they want to capitalize on both the tremendous market opportunities and disruptions that will be created by MPayments.

Although rather similar, there is a need to distinguish Mobile Banking from Mobile Payments, but it should be also said that the dividing line between Mobile Payments and Mobile Banking is increasingly blurred, especially in developing countries.

The definition of a mobile payment is often open to interpretation and can differ from source to source. For example, Juniper Research company has a simple definition of a Mobile Payment as 'payment for goods or services with a mobile device such as a phone, PDA (Personal Digital Assistant), or other such device.' [4] Investopedia defines Mobile Payments as 'Money rendered for a product or service through a portable electronic device such as a cell phone, smartphone or PDA. Mobile payment technology can also be used to send money to friends or family members.' [5] Finally, as the third, more comprehensive definition of MPayment we can cite the one from Gartner who defines it as 'transactions conducted using a mobile phone and payment instruments that include [6]:

- Banking instruments such as cash, bank account or debit/credit card, and
- Stored value accounts (SVAs) such as transport card, gift card, Paypal or mobile wallet
- Carrier billing using the telecom’s billing system with no integration of the bank’s payment infrastructure, or
- Telebanking by using the mobile phone to call the service center via an interactive voice response (IVR) system. However, IVR used in combination with other mobile channels such as Short Message Service (SMS) or Unstructured Structured Service Data (USSD) is included.

2 The Evolutionary Path of MPayments

A story about Mobile Payment begins in 1997, when in Helsinki (Finland) two Coca Cola vending machines were installed that could be activated using mobile phone. The Short Message System enabled potential
buyers to pay what they wanted from the vending machine.

In 1998 appeared first opportunities to sell digital content by downloading it on the mobile phone. Finnish Radiolinja company offered ring bell sounds to users who were willing to pay a symbolic amount of money.

First national commercial platforms for Mobile Commerce, including MPayments, were introduced in 1999 by Smart Money Company in the Philippines and NTT DoCoMo in Japan.

2000 was the year in which in Norway the first car parking Mobile Payment system was introduced, and practically at the same time in Australia was implemented railway ticketing system using MPayment and in Japan the first airplane booking system based on mobile technologies.

The first book that systematically analyzes MPayments named ‘M-profits’ was written and published by Tomi Ahonen, professor at the Oxford University. At the same time he started the first university course dealing with Mobile Commerce.

From this point, i.e. from the very beginning of the 21st century, the MPayment propagation exploded throughout the World. For example, the first advanced MPayment system in Croatia was established in 2002 in the capitol of the country – Zagreb.

In its about 15 years long life, we can recognize three phases of MPayment evolution. They will be explained and discussed in the following section of the paper.

3 Three Phases of MPayments Evolution

The three phases of the MPayment development that can be identified are:
- Phase 1 – Short messaging-based payment
- Phase 2 – Payment using mobile Internet browser
- Phase 3 – Downloadable application-based payment

Each of those phases is interesting for some reason and fundamentally innovative. Each of them establishes a new and more qualitative type of relationship between bank or other payment service provider and their customers, but also imposes new, always more dangerous threats and bigger worries.

In the next three paragraphs of the paper we will try to examine those phases in some more details.

3.1 Phase 1 – Short messaging-based payment

In the early days – and in some countries and areas even today – this was the most popular method of mobile payment and the easiest to deploy from the financial institution’s point of view. Short Messaging System (SMS) text is by far the predominant mobile phone technology in use for mobile payment messaging, although Unstructured Supplementary Service Data (USSD) service for GSM mobile users is also used in some applications [7].

Messaging is used to alert bank customers of account balances, overdraft limits and for notification of important transactions, such as payments. Most messaging services are free to the user but some retail banks have charged a monthly subscription for alerting and have seen a reasonable uptake for the service.

There have been few instances where even transaction-based services have been offered via SMS. However, one of the major reasons that SMS based transaction services have not achieved much traction is security because is acknowledged to be not secure [8]. The main advantage of SMS mobile payment applications is that almost all mobile phones can use SMS.

There are a number of banks which have implemented or have plans to deploy secure messaging where the consumer is required to download an application to the phone that manages the secure transmission of messages between the two parties.

3.2 Phase 2 – Payment using mobile Internet browser

Banks have deployed mobile internet and WAP Websites since the late 1990s but consumer adoption has only been significant in recent years as a result of faster mobile broadband networks, cheaper or flat rate data network tariffs and more advanced mobile handsets such as smart phones [9].

Most mobile internet payment Website users will have access to mini statements and balance enquiries at the base level and more advanced services including payment instructions and bill payments.

The advantages of using a browser-based service include security – no information is left on the phone, and from the viewpoint of rapid rollout, the browser is the universal application on smart phones and no special download is required. In addition, if the mobile site mimics the online site, then users will be very familiar with operation.

3.3 Phase 3 – Downloadable application-based payment

A development of recent years has been the downloadable application that offers MPayment service provider’s customers a selection of services through a single application delivered by the bank or other
financial institution to the consumer’s mobile phone [10].

The application is mainly Java or Brew-based, but can also be based on an STK (Subscriber Identity Mechanism (SIM) Toolkit) which is used by Mobile Network Operators (MNOs) to provide added value data applications. The application can be easily customized depending on the user interface complexity supported by the mobile. In addition, mobile applications enable a very secure environment. The main disadvantage of downloadable application clients is that the applications need to be customized for each different device model: typically at the moment, for example, applications for the iPhone and the Blackberry are receiving a lot of press.

Services that are available through a typical downloadable application include balance account statements, bill payment, funds transfer and an Automated Teller Machine (ATM) locator.

4MPayments Ecosystem

There are three major areas in which MPayments are used:

- Payments in Mobile Commerce
- Payments on the Point-of-Sale (POS)
- Payments between people (Peer-to-Peer (P2P) payments)

Those are major elements of the whole MPayment ecosystem and are schematically depicted in Fig. 1.

![MPayment Ecosystem Diagram](image)

As it can be seen in Fig. 1, in different parts of MPayment ecosystem different modalities of MPayment are practiced. Variability is the greatest in the area of M-Commerce where specialized payment applications, payment functions embedded in some other applications, browser-based payments, billings made by network carriers and operators, and the oldest type of MPayment – SMS-based payments.

MPayments can be used also at the Point-of-Sale (POS) locations. Here, payments may be made using near-field data transfer technologies (e.g. BlueTooth), than Quick Response (QR) codes, over remote mobile peripherals or by usage of various stickers.

Finally, when payments and settlements are made between people, i.e. MPayment system users themselves, SMS-based payments dominate, but there are some solutions using popular social networks and other media, virtual and other kinds of digital money, and also near-field technologies.

5MPayment Trends and Challenges

As we could expect, the MPayment development process will not stop here. The future of in this field brings, of course, new solutions and opportunities, and probably new challenges and uncertainties, too.

Trends are those forces that have high impact on the market, as well as high predictability. Six trends related to MPayments development in the future can be evidenced, at least in USA [11]. The most significant among them are as follows:

- Smartphone and similar devices penetration
- Consumer privacy concerns
- Ongoing security risks
- Overall MBanking and MPayments growth
- Perception of financial risk of MPayments
- Millennial adoption

However, there are even more challenges and uncertainties accompanying those trends. Uncertainties and challenges are those forces that have high impact on a market, but are difficult to predict. Representative list of them is as follows:

- MPayment economics
- MPayment adoption
- MPayment security
- MPayment privacy & data ownership
- Market structure & power
- Government regulation
- MPayments’ ease-of-use
- Adoption of near-field communications versus alternative technologies and solutions
- Non-retail use cases
- Increasing/decreasing popularity of MPayments between people, i.e. Peer-to-Peer (P2P) payments
- MPayments experience evolution
• Integration of MPayments with other types of services
• M-Commerce development/growth
• Health of overall economy

We shall comment on those trends and challenges very short. As far as smartphone and similar mobile devices penetration, Fig. 2 talks for itself.

Fig. 2 – Global smartphone and similar mobile devices penetration [12]

Each new technology brings its own concerns and problems with user privacy and system security. Mobile technology is no exception in this sense. But, expansion of MPayments is impressive at the worldwide scene, as it can be seen in Fig. 3.

Fig. 3 – Growth of worldwide mobile payment service market [13]

As times go by, perception of financial risk of MPayments is continually more favorable, thanks to continually better and safer mobile solutions. Frauds and thefts are even more infrequent, although they should not be underestimated.

All those trends lead to millennial adoption of mobile technologies generally, in various applications, and MPayments as well.

There are much more challenges and uncertainties than trend related to MPayments and that is why we will not comment each of them but only selected ones.

The first challenge is MPayment economics when compared to usage of payment cards. It is hard to predict what a relationship between fees charged for MPayment and payment card usage fees will be. Some predictions state that fees for using MPayment system will decline, what will be a main incentive and foundation for MPayment economics improvement. However, those are only predictions which have still to be verified [14].

MPayment adoption, security, user privacy and data ownership are topics that were directly or indirectly addressed in the previous paragraph of this paper and we will not repeat it once again.

The question of MPayments market power can be answered only if all stakeholders and market players are taken into account. The most important among them are credit cards issuers and carriers, banks and other financial institutions, wireless network operators, retailers, and MPayment device developers. If we look at Fig. 2, we will notice a strong development or, better to say, a high rate of expansion in all the segments of mobile technology. That is why we probably may conclude that MPayments market power will grow approximately at the similar pace.

Maybe one of the biggest uncertainties is government support and regulation. Administration is usually very slow in reacting and answering on real life requirements and we are not sure it will radically change in the near future. So, this may be one of the greatest obstacles to MPayment development in all its aspects.

With a high degree of certainty we can state that mobile payment devices ease-of-use will become more and more attractive in the future times since this is and has been the case with many other sophisticated technological products.

Related to previously mentioned issue is the question of near-field communications (NFC) vs. alternative solutions. If NFC products become easier to use than other similar devices, they will dominate and be more adopted among users.

Proliferating non-retail use cases, increasing or decreasing popularity of MPayments between people, i.e. Peer-to-Peer (P2P) payments, MPayments experience evolution, and integration of MPayments with other types of services will depend on health of overall national and international economy and M-Commerce development/growth. In turbulent times like these we are witnessing predictions and/or forecasts of this are extremely hard task.
In its long-term forecasts the World Bank notes the fast expansion of Asian (primarily Chinese and Indian) and Latin American economies and stagnation of European and North American economies. In the absence of European and North American more ambitious policy changes, imbalances will emerge which could undermine worldwide growth [15].

6 Four Scenarios of Feasible MPayment Development in the Future

The theory of scenario planning requires selecting few most influential challenges or uncertainties and use them as a basis for designing possible scenarios [16]. We have chosen two challenges we consider the most important in the case of MPayment: MPayment fees as important constituents of MPayment economics and market power of stakeholders, i.e. market players.

From this, two extreme outcomes for these uncertainties were identified to create a two-by-two matrix. From there, the four scenarios emerged. They are shown in Fig. 4.

6.1 Scenario 1: Credit Carriers Domination

In this scenario, credit-card networks maintain market share and partner with carriers to expand their position. PayPal emerges as a viable option for brick-and-mortar merchants. The ecosystem continues to benefit the large credit-card players, although they are forced to reduce interchange fees in response to competition from alternate payment networks such as PayPal.

Mobile-security concerns initially inhibit MPayments, however, card-association mandates and NFC security improvements along with incentives begin to encourage consumer acceptance [17]. Card associations, carriers and merchants will have access to better consumer data, which will be used to drive loyalty.

Finally, government security regulation slows mobile adoption until enhanced technology opens the door for growth.

In this scenario winners are payment card issuers, credit-card networks, carriers, and banks. On the other hand, losers are social/Web players, retailers/merchants and consumers.

6.2 MPayments for the People

In this scenario, Web, social, and tech players (such as Google, Amazon, Apple and some others) provide MPayment opportunities that benefit merchants and end-users.

The latter steadily move away from using plastic. A fragmented and diverse set of solutions supported by an underlying common infrastructure emerges. This is driven by Web, social and tech players and supported by pro-MPayment organizations such as the MCX.

Better user experiences, services beyond the transaction and higher security drive the adoption of MPayments by consumers. People are willing to share part of their data in exchange for loyalty services/rewards, such as targeted product promotions. They will also be able to collude, via crowd sourcing for instance, to drive down the price of their favorite products. The government allows emerging and large Web/social players to set standards and security processes.

If this scenario becomes dominating, device manufacturers, retailers/merchants, MPayment tech vendors...
and consumers will be the winners. Losers will be payment card issuers, credit-card networks, and banks.

6.3 MPayments … if We Have to
In this scenario, credit-card players and PayPal dominate at the expense of merchants and alternative players. Carriers fail to scale their own model and just exist in their traditional role as network providers.

The ecosystem consolidates around large credit-card players and PayPal as emerging models fail to win over consumers due to poor security and lack of a compelling value proposition. Large credit-card players acquire small POS players to better target small merchants.

Security issues with alternative models (QR/bar codes, SMS, P2P) and lack of a better user experience limit adoption. Credit-card players will amass more data and sell back to merchants and brands to drive/shape loyalty programs. A pro-bank government maintains merchant fees and increases MPayment security/privacy legislation, favoring existing players.

If this scenario once becomes truth, the major winners would be payment card issuers, credit-card networks, and banks, while major losers would be MPayment tech vendors, retailers/merchants, and consumers.

6.4 New Dogs, Old Tricks
In the final scenario, power shifts greatly toward emerging Web, social and tech players (such as Apple, Google, Amazon, Facebook). Carriers have a minor role in MPayments, focusing on billing for low-income customers or those who don’t have their own bank accounts. Credit-card companies are alive, but not in control of the MPayment-market evolution.

Instead, the market ecosystem consolidates around large, edge players who have acquired emerging payments players (such as Square and LevelUp). Innovation continues from startups with the expectation they will be acquired by one of the larger power players. Increased awareness of alternative payment solutions among consumers are driven by loyalty programs and/or benefits and social media.

Consumer security and privacy concerns take a backseat to the benefits customers derive. MPayments and loyalty programs are linked to social media and advertising. Government maintains merchant fees and existing security/privacy legislation around MPayments, but struggles to adapt to technology changes and implications.

In this case those who will profit will be social/Web players, MPayment tech vendors, retailers/merchants and consumers, and those who lose payment card issuers and credit-card networks.

7 Final Thoughts
Each of these scenarios presents specific challenges for stakeholders, especially for retailers, financial institutions, brands and technology players.

Because the outcome of the MPayment market is uncertain, companies need to construct strategies by betting on the scenario they think is most likely to emerge, while also developing contingent plans that allow them to maintain agility should a different scenario emerge. Still, there are steps that different players can take today to prepare for the inevitable market shifts ahead.

Whatever the ultimate outcome for mobile payments, an inevitable and significant market shift will occur. Ignoring mobile payments will not make them go away. Instead, companies that don’t begin planning today will lose ground to competitors and other stakeholders who capitalize on what will be a more than $1 trillion market in just several short years.

References:


