

IMPLEMENTATION MODELS IN MOBILE PAYMENTS

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ABSTRACT

Despite the high expectations, mobile payments have not reached projected adoption levels. Understanding success factors in m-payments has become an important research goal. Our previous study has revealed that the lack of cooperation between the main players, including banks, mobile operators, and independent providers, is the significant barrier to mobile payments success. This paper reports on the findings from a qualitative study where the issue was discussed in a web-based survey, and explored in detail in subsequent follow-up email interviews. This research reveals how each of these stakeholders' strengths and weaknesses could affect their role in mobile payments diffusion. It reports on the current status of collaboration among the main players, and finally, outlines the possible roles of mobile operators, banks, and independent providers in successful implementations of mobile payment solutions.

KEY WORDS

mobile commerce, mobile payments, Interdisciplinary Applications of Computer Science and Technology

1. INTRODUCTION

Mobile payment (or m-payment) refers to paying for goods or services with a mobile device (such as a mobile phone, smartphone, or Personal Digital Assistant) by taking advantage of wireless technologies (such as mobile telecommunications networks, or proximity technologies). The devices can be used in a variety of payment scenarios, such as payment for digital content (e.g. ring tones, logos, news, or music), concert or flight tickets, parking fees, and taxi fares. Payments for physical goods are possible as well, both at vending machines, and manned Point-of-Sale terminals. Typical usage entails the user electing to make a mobile payment, being connected to a server via the mobile device to perform authentication and authorization, and subsequently being presented with confirmation of the completed transaction [1]. Mobile payments may be one of the most important building blocks of mobile commerce, as m-commerce cannot reach its full potential without a way for customers to pay. In order for the mobile commerce to take place anywhere

and anytime, the payment method also needs to be wireless and mobile.

A mobile phone has a potential to become an ideal payment device, better than traditional methods such as cash, credit or bank cards, and cheques. A phone is small, personal, familiar, and most people never leave home without it. It has a sole ownership feature, and often positive emotional connotations. Unlike all other payment methods, a mobile device has its own and always available display and input units, as well as a number of connectivity options. Furthermore, services over a mobile phone can be customized (based on the user's phone number), and localized (based on the location of the user). Finally, there are 1.7 billion of mobile phone users in the world nowadays [2], over a quarter of the world's population, which means the same number of potential users of mobile payments.

Despite this obvious potential of mobile payments, the uptake so far has been rather disappointing. Mobile payments have not reached the expected adoption levels. There are numerous pilots, with one company often involved in several different initiatives. The systems do not reach expected customer bases. Because of this obvious gap between what a mobile payment can become, and where it is now, numerous questions have been asked about the reasons for this slow adoption. Our previous empirical study [3] has revealed that the lack of cooperation between the main players is a significant barrier to mobile payments success. This paper reports on the findings from a qualitative study where the issue was discussed in a web-based survey, and explored in detail in subsequent follow-up email interviews.

As the main players in the field include mobile operators, banks, and independent system providers, the research focused on exploring how each of these stakeholders' strengths and weaknesses could affect their role in the mobile payments diffusion, the current status of collaboration among the main players, and finally, the type of roles the mobile operators, banks, and independent providers should play in successful implementations of mobile payment solutions.

The research methodology is explained in Section 2. Section 3 analyses the strengths and weaknesses of the key players as mobile payment providers, while Section 4 reports on current situation in the field. Collaboration scenarios are discussed in Section 5, while Section 6

explores other possible implementation models in m-payments. Conclusions and further research are discussed in Section 7.

2. RESEARCH METHODOLOGY

The study draws on the expertise of people involved in mobile payments projects. In the first phase of the study, selected people were invited to provide their opinions in a qualitative web-based survey. The survey consisted of three open-ended questions that focused on discovering the barriers to the success of mobile payments, and the most critical issues that need to be tackled so that the full potential of mobile payments can be realized.

This research was based on stratified purposive sampling, which means that cases were selected from previously identified subgroups [4]. Unlike quantitative studies, this sampling does not need to be statistically representative, since it is not going to be used to generalize to the large population. This technique, however, not only makes it possible to gather a variety of perspectives on the research problem, but it also enhances the credibility of the data that can be confirmed by several sources. Purposive sampling aims to create rich, in-depth information [5].

The following groups of people were targeted. Researchers were seen as an important source of knowledge as their work requires familiarity with all the developments in the field. To identify the m-payment researchers, an extensive review of literature was conducted. The selection criterion for researchers was the minimum of two peer reviewed publications regarding mobile payments.

Finally, a number of practitioners were approached to shed more light on the problem area. This group of participants consisted of representatives from companies providing, considering, or being involved in mobile payment solutions. The researchers hoped that the practitioners' experience with workable solutions would reveal a number of issues and challenges. Such stakeholders were likely to know exactly what hinders successful diffusion of mobile payments. The companies were identified using personal commercial contacts, search engines and relevant portals.

The forty-seven (47) respondents who completed the web survey included representatives of financial and banking institutions, mobile operators, third-party mobile payment system providers, phone manufacturers, mobile application developers, mobile technology consultants, usability consultants, and mobile payment researchers. The participants came from Asia/Pacific region, Europe, Asia, North America, and South America. The respondents revealed not only the barriers to success in mobile payments, but also provided their solutions to ensure success.

In terms of the sample size, in qualitative research the number of participants is less important than the richness of data. Purposive sampling should be used to the point of redundancy [5]. The sampling should be concluded when

no new information is forthcoming from new units; accordingly, redundancy was a primary criterion that determined when the sampling in this study should terminate.

To obtain as broad coverage of issues as possible, and because of a limited number of local initiatives in Australia, web-based surveys with open questions were used instead of face-to-face interviews. This ensured independence of time and place, and enabled the authors to get responses from people from all around the world. The selected stakeholders were emailed the link to the survey with an invitation to participate.

The analysis of data from the first survey revealed that the most often discussed barrier to success of mobile payments is the lack of cooperation among the main parties, mainly mobile operators, banks, and independent providers. Twenty-eight (28) out of the forty-seven (47) participants mentioned this as one of the barriers to success or the most critical area that needs to be studied for mobile payments to become truly successful.

As no other issue has been so frequently mentioned in the study, it seemed worthwhile to explore it further in more detail. Other results from the first survey will be reported in separate publications. This paper reports on findings concerning the cooperation issue, and how it can help achieve success in mobile payments.

The participants who mentioned the key players issue in the first study were invited to provide further comments on this specific topic in follow-up email interviews. Specifically, these respondents were asked about the strengths and weaknesses of various players as m-payment providers, problems with current partnerships, and about advantages and/or disadvantages of various collaboration models.

In this paper, when discussing our results, we follow a strategy suggested by Johnson [6] to promote validity of qualitative research such as this one. Low inference descriptors are description phrased very close to the participants' accounts and researchers' field notes [6]. Verbatims (direct quotes) are a commonly used type of low inference descriptors, and therefore this paper utilizes direct quotes from the subjects extensively to improve validity of the research. Such examples of data not only validate the conclusions, but also provide rich illustrations of the topic.

The research has also been supplemented by an extensive literature review, the result of which is an analysis of existing opinions on the matter found in conference papers, journals, white papers, and articles. The strength of this research lies in the fact that these findings have been supplemented by opinions of experts in the field, including third-party m-payment system providers, banks, and operators, who have had experience with introducing such systems or with problems preventing them from doing so. Such a research design ensures a wide coverage of issues, making sure that various perspectives are taken into account. Very little empirical research has been reported on the issue to date, thereby highlighting the significance of this study.

3. STRENGTHS AND WEAKNESSES OF KEY PLAYERS AS MOBILE PAYMENT PROVIDERS

3.1 Mobile operators

Strengths

Mobile network operators are often considered natural candidates for offering mobile payments because of their large customer bases ([7], [8], [9], [10]). Furthermore, this ownership of customers is very tight, and mobile operator brands are strong [10]. Operators have access to consumers through handsets, so this relationship is direct and privileged [11]. Henkel [7] also emphasizes the strength of operators' relationship with consumers. One of our study respondents supports these claims observing that *"operators believe that they own the channel and the customers, and see an opportunity to enter the space"*.

Another important issue is reported by Krueger [8] and Northstream [9]. Vast experience with billing, combined with their technical expertise, is likely to help mobile operators succeed in the mobile payments field. The infrastructure already exists to charge customers for services that they or others provide. Similarly, Buhari et al. [11] emphasize operators' experience collaborating with numerous service and content providers, and, again, their sophisticated billing and accounting systems. Ahonen [12] accurately depicts the sophistication of mobile operator's billing systems. As the author points out, operators' current billing and charging systems are like no others in the world. They are able to track every possible detail about each call. Operators know not only the user's location and the network they are in, but even how they move from one coverage area to another. Unlike other industries that consolidate sales, telecommunication companies are able to time, log, and bill every second of airtime.

Roaming and interoperability are other strengths pointed out by Costello [13], who agrees that network operators are well placed to take advantage of mobile commerce. Their billing and roaming experience can be used for efficient processing of micropayments. Their interoperability in turn can be used to create the required scale. Krueger [14] adds that mobile operators who operate internationally may find it easier to offer international payment systems.

Moreover, network operators offer prepaid accounts, which can make it an attractive alternative for customers that are not eligible for credit, or simply do not want to be tied to a contract [8].

Mobile companies can also enable access to new services because they own the networks [9]. Costello [13] highlights the importance of the ownership of licensed spectrum. Because operators can localize the user via their network technology, they can offer location-based services [14].

Henkel [7] also realizes that because of their SIM card in the user's phone, mobile operators can influence a central

piece of technical infrastructure, and so control the device.

Mobile operators seem to be highly motivated to invest in this new service. As reported by Krueger [8], operators are keen to find new models for revenues to justify their investments into expensive 3G (third generation) networks. The author predicts that mobile payments could become the mobile operators' key sector. It is in their interest to increase both the traffic on their networks, and revenues from the sale of value-added services. The issue of justifying investments in 3G networks is also raised by Costello [13], who estimates spending for 3G in Europe alone at US\$250 billion. When Henkel [7] talks about justifying the spending on 3G telephony, he expects pure airtime to become a low-margin commodity.

One of our industry participants sees the following strengths of operators as m-payment providers: they already reach nearly everyone, wireless infrastructure is already in place, they are open to new technologies, and always in search of new business cases (since selling bandwidth is not enough), and finally, operators are big enough for such a business.

Weaknesses

There are some challenges that mobile network operators will have to consider before entering this new market. First of all, they could face legal issues ([7], [8], [11]). If prepaid phone accounts are to be used to pay for services of other companies, then such accounts become electronic money. Special licenses are then required [7]. In Europe, a required license is issued by the Electronic Money Institute, or EMI [8]. In some cases, mobile operators would even need to obtain a banking license. Ondrus [16] reports from his interview with an operator project manager that there are legal concerns, especially with the prepaid account, since operators can only sell airtime with this scheme. Otherwise, a prepaid card would become a stored value account regulated by the banking license. Risk management would be another challenge [14], as well as quality of service. These will be complicated by payment roaming demands. Another challenge would be revenue sharing [8], where mobile operators have to pass revenue to others. It requires periodic clearing and settlement.

There are also challenges connected with mobile operators adding the charges for mobile commerce on the phone bill. Costello [13] argues that when third party goods appear on the operator bill, it may create the impression that the operator is expensive, and produce 'bill shock.' Sometimes operators may be restricted in what they are allowed to put on a bill. The author further argues that many businesses pay for employees' voice and data calls, but may not be happy to see increased costs on the bill for non-work related services.

An independent system provider in our study points out that operators are new to banking business cases, and may need to get a banking license. As well, they are still *"a bit frustrated because of the Universal Mobile Telecommunications System (UMTS) crash and heavy*

money loss", and they have already failed with unsuccessful and incapable models before.

Moreover, the premium SMS model seems to be flawed: *"a problem to be overcome is the current revenue share model for premium SMS services. Telcos take far too much of a revenue share (approx 35%) which does not allow significant margin for applications to be sold via this channel"*. Another respondent also believes that the main barrier to success is the percentage of revenue that operators take out of payments when using premium SMS, and this participant sees the potential in non-operator driven payment solutions.

One expert that took part in our survey believes that *"telcos do not have the focus or capabilities to drive the capability into the banking or business sectors."* A consulting company participant argues that the critical problem is the lack of interest of the carriers.

As another respondent points out, operators (as well as banks) are *"unable to allocate sufficient resources/ focus /mind share to the opportunity due to other priorities"*.

3.2 Banks

Strengths

Trust is one important advantage that financial institutions have in relation to mobile payments. Krueger [8], for example, believes that consumers would like banks to continue to be their main payment providers, given the long-established relationship of trust. Customers, according to Buhan et al [11], are used to paying through banks. These authors also quote Forrester Research study that found out that most retailers would prefer financial institutions as one of the partners in a payment system. Henkel [7] additionally stresses the banks' high reputation for reliability, and long-standing customer relationship. Ondrus [16] also argues that the advantage that financial institutions have over operators are their brand names, as consumers trust and are loyal to classic payment schemes. If banks decided to extend the use of their payment systems to mobile payments, they would have instant recognition from the consumers since they already know the brand, and they have been using it on many occasions without any problems [16]. They would likely have fewer concerns about security and privacy as banks base their reputations on these quality features [16]. Dahlberg et al [17] report that in their focus group interviews with customers, banks were seen as the most trusted providers of mobile payment solutions.

Payments are a core business of financial institutions. Northstream [9] points out that banks have long been involved in financial transactions, both in issuing and acquiring, and as clearing houses. They have expertise to handle transactions and risk, the necessary licenses, legacy data systems, and both merchant and customer bases. Henkel [7] similarly stresses banks' experience in payment services and risk management. Another expertise is in cross-border transactions.

Other banks strengths, as discussed by a mobile payment provider in our study, include the banks reaching already

nearly everyone nowadays, and the fact that they already have bank licenses.

According to some, banks simply have no choice but get involved in mobile payments. Only in a bank-dominated model, can banks have complete control over customer relationships and payment systems, so they can keep their supremacy [16]. Jones [18] agrees that banks have to deal with mobile payments, since otherwise they will be 'out of the loop'. If they let the billing model take over, consumers will not need them since a credit card or bank account will not be necessary. A survey response reveals that *"banks see payments as their space and are rightly nervous and cautious about operators taking it from them"*. A usability designer believes it is necessary to find out how m-payments can tie into existing banking systems, so we can be able to pay for items from current bank accounts.

Weaknesses

There are also negative sides of banks involvement in mobile payments. As Birch [19] realizes, banks do not make much money from payments. According to the author, the top 25 banks in the USA derive just 7% of their operating income from payment revenues. This would mean that banks may lose interest in developing a new payment infrastructure.

Yet another issue is raised by Krueger [8], who points out that a bank-dominated model would negatively influence the situation in mobile payments, because of uncompetitive practices among banks.

A third-party m-payment system provider in our study observes that *"the banks have perceived security risks, dread the loss of control of the payments process, and have few competent resources to drive the capability into the business sector"*.

Another respondent claims that banks do not like technology changes very much, and that they may be too big, too slow and too retrospective as potential mobile payment providers.

3.3 Independent providers

Independent start-up companies, as Hort et al. [20] point out, could act as intermediaries between consumers, merchants and banks. Moreover, because mobile payments require completely new systems, start-up companies can enter the market as first movers with new sophisticated solutions. They can be more flexible and faster to explore new technologies than mobile operators or banks. The risk of losing reputation is not an issue for them [20]. Their key advantage is that such companies would enable services to the user regardless of their mobile operator or a bank [21]. According to one expert, people may be reluctant to give more power and details to operators and banks, hence an opportunity for independent providers. For a merchant, it would be more beneficial to team up with such an independent provider than with several separate mobile operators [9]. On the

other hand, such independent players would clearly have to build their customer base from scratch [22].

One of our industry participants points out that independent providers are fast to move on business opportunities, and their focus is rather more solution-based, than product-based, and rather more revenue-based, than cost-based. Such start-up companies can focus their resources on customers' solutions, and not on compliance, upgrading core technologies, or cost reduction initiatives. Their weakness however, according to the respondent, is the lack of existing relationships, limited experience in the industry, and the lack of spectrum, banking license, or connection to the banking infrastructure. The lack of a brand name, customer base and trust make it extremely difficult for such providers to remain in the market as seen by the collapse of many such schemes such as PayBySnap in Australia in 2005.

4. PROBLEMS AND CHALLENGES IN CURRENT IMPLEMENTATIONS

Presently, collaboration between banks and mobile operators is limited, as both want to control most of the value chain so as to increase their revenue [16]. According to our findings, this issue is believed to be a significant barrier to success, mainly *"the behaviour of (potential) mobile payment service providers, especially mobile operators and banks"*. There is *"a lack of market support from network operators and financial institutions"*. According to one respondent, there is a lack of business agreements among all involved parties, including banks, and mobile operators.

Another expert claims that *"the strong position of banks and credit card organizations, who rule the market, hinder success of new market entrants"*. What is more, *"monetary institutes do not want to cannibalize their current business cases"*. One other expert reveals that *"transferring money into the payment system/wallet/account is always the biggest hurdle and these systems invariably need to come via the banking system which has inherent delays - 48 hour processing and funds transfer delays in most cases"*.

Currently, according to an independent system provider, both banks and operators *"have too much of a vested interest in their own business (banking licenses/spectrum) to successfully partner with each other or an independent. They see all other organizations essentially as a threat in payments."*

Not only banks and operators are believed to play a role in preventing success of mobile payments, but also *"protectionist practices by the established providers of networks (carriers), terminals (mobiles & EFTPOS), banks (national and international) and card schemes. Each party seeks to grow their market share by providing 'entry' to their contributing or owned partners. Technical and commercial initiatives are discouraged by the list of barriers within each industry group"*. Nowadays, *"any*

mobile payment service tends to slice up the market because not all participants are involved".

5. COLLABORATION AS THE KEY TO SUCCESS

As revealed in Section 3, various players offer numerous benefits in the implementation of a new mobile payment system, and they possess a number of advantages as m-payment providers. Currently however, as revealed in Section 4, the lack of collaboration between the players seems to hinder the success of mobile payments. It seems logical then that some researchers, such as Hort et al. [21], believe that banks and mobile operators do not have to compete with one another. The most successful business models could be those based on strong partnerships between the two key players. Partnerships are viewed as essential by Kountz [22] as well. Kountz sees backing from both a financial institution and one or more carriers as a prerequisite for success. Wallace [23], who also sees cooperation as the key issue, contributes early success of Paybox (German m-payment solution) to its partnerships with both banks and operators. The author sees a well-supported standard, with cooperation from both key players, as crucial to provide perceived security, which is the key to success of mobile payments. JupiterResearch [10] similarly recommends choosing providers with strong links to both telecom operators and banks.

Vilmos and Karnouskos [21] present a design of a new payment system, and the basic principle of their business model is the cooperation between banks and mobile operators. The benefits are maximization of revenues, combination of customer bases, and combination of transaction potentials. Existing infrastructures can be integrated. The banks in this particular system will deal with macropayments (payments above \$10), and mobile operators will process micropayments. This seems a viable and promising proposition.

As far as systems of independent providers are concerned, even though he acknowledges their speed, innovativeness, and flexibility, Henkel [7] does not think that such new companies have enough strength to establish payment systems on their own. The author maintains that such independent companies do require partnership of banks or mobile operators. This view could be supported by the pullback of Paybox, one of independent companies established specifically to provide m-payments. According to some, Paybox market withdrawal was due to a lack of cooperation between banks and mobile operators.

Another recent withdrawal involves Simpays, an initiative of four major European operators that was meant to become interoperable across European countries. In an interview, Pouttschi [24] argues that the concept of such a vertical alliance was flawed, and *"for these purposes we need banks in the boat"*.

Our empirical findings support these views from the literature. A number of respondents in our research also discussed the need of cooperation between various

players. "Collaboration between the financial institutions and the telcos is necessary", and the banks and operators need to "find a way to commercially work together to provide an industry wide service". What is needed is "bank and telco cooperation to create a single set of interoperable cross-bank and cross-telco scheme rules". "Collaborative open business models" are the key to success of mobile payments, according to another respondent. Another expert argues: "I believe there is an appropriate and happy position for both industries to gain value, however, it is going to be some time before this is found". Finally, there is a need to "demonstrate value for banks, telco and merchants so that they do not end up eating each others' lunch". One of the providers believes that "research could assist to prove to both operators and banks that they must act cooperatively together to make the market sustainable and valuable to all. And that there is a role for each to play".

Yet another third-party provider believes that "it would be wonderful to discover a way to work closer with banks directly. Currently there are too few paths to the banking services, and a few large organizations monopolise those paths. If there were a way for smaller organizations to offer services over a common gateway service supported by all banks, then this would be a most useful result".

Such a collaboration model would make it possible to combine potentials of the key players, as depicted in Figure 1.

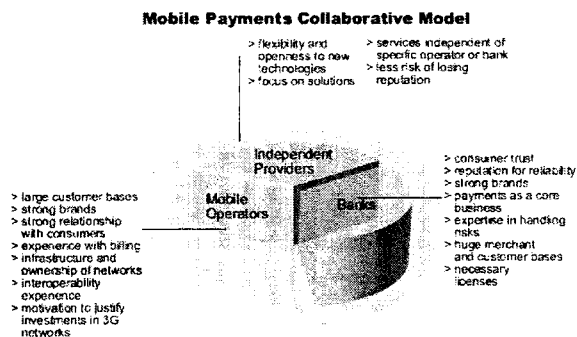


Figure 1. Combining potentials of the key players in mobile payments: a collaborative model

6. OTHER POSSIBLE IMPLEMENTATION MODELS

Even though collaboration and partnerships have been recommended by many as a necessary condition of success in m-payments, some respondents presented different alternatives.

One third-party provider believes that "ideally a mobile payment solution should be operated by a third party without a telco interest, but with a significant market power in terms of obtaining customers". Another third-

party provider also believes that the successful model would be one dependent on "payment methodology not involving the carriers and not requiring pre-registration (a la PayPal)".

On the other hand, another independent system provider recommends that "the ideal model for mobile payment is where the consumer can use their mobile phone to make payment directly from their existing banks accounts. Payments going back to the phone bill are not economic for operators except for a very small part of the market. Creation of new accounts to facilitate payment (e.g. in a PayPal model) is inefficient - although may ultimately be the successful model if banks and operators do not come together".

An Australian mobile operator respondent reports that we must find out "who is skimming the most money off the top ... the system needs to be cost effective for all involved - if big operators are a player, it is likely they will try to take the lion's share of the payment amount in 'commissions'".

Finally, it could also come down to the issue of trust, as a system provider suggests that more research is needed first to "find out what people would trust and use and from what brands. E.g. would a bank endorsed payment system be favoured over a non-bank (independent 3rd party) operator such as PayPal?" Similarly, a bank representative believes that it is important to research "what influence will 'brand' play in customer take-up. For example, if Virgin m>Banking was introduced versus a Bendigo Mobile Banking... would this trigger more or less trust, and more or less propensity to try it".

7. CONCLUSION AND FURTHER RESEARCH

This paper explored the issue of collaboration among the main players in the mobile payments arena. Even though some see the possibility of a successful m-payment without the collaboration, the majority of opinions both in existing literature and in our qualitative studies suggest that successful mobile payments solutions will be based on strong partnerships between the main stakeholders, which include banks, mobile operators, and third-party providers. Each of them has a number of characteristics that can help successful adoption and diffusion of mobile payments.

Mobile operators have large customer bases, and very close relationships with customers with direct access to them. Moreover, they own licensed spectrum, and possess sophisticated billing mechanisms in place. They have experience in roaming and interoperability. Operators want to increase traffic and find additional revenues. They can influence central infrastructure (SIM card). They can also offer location-based services.

The key advantage of banks is the customers' trust and their reputation for reliability. They have experience in risk management. Customers are used to paying through banks, which have expertise in payments. Banks have

enormous customer and merchant bases. They have cross-border expertise as well.

Partnerships would offer the benefits of maximization of revenues, combination of customer bases, and combination of all the potentials. Existing infrastructures can be integrated.

Our future research will further explore the issue of collaboration in mobile payments. The next step will involve the use of case studies of existing mobile payment initiatives to discover more about successful and unsuccessful partnerships between the key players, and other possible collaboration models.

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