RESHAPING THE FRAMEWORK FOR ANALYSING SUCCESS OF MOBILE PAYMENT SOLUTIONS

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ABSTRACT

Despite the potential and expectations, mobile payments have not reached expected adoption levels. Establishing success factors in m-payments has become an important research goal. Traditional acceptance models focus on characteristics of new technologies (innovations) that the user perceives. According to Damsgaard and Gao (2004), what is missing in the traditional models is the discussion of infrastructure traits of an innovation. A qualitative study has been used to measure the validity of these assumptions in the mobile payments field. Experts that represented key stakeholders were asked to draw from their experience and explain reasons for the lack of success of m-payments. Based on the study, this paper proposes a holistic framework for analysing m-payment success factors.

1. INTRODUCTION

Mobile payments (or m-payments) are payments for goods and services in which at least one part of the transaction is conducted using a mobile device (such as a mobile phone, smartphone, or Personal Digital Assistant) and wireless technologies (such as mobile telecommunications networks, or proximity technologies). Examples of mobile payments include 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. Mobile payment is seen as an important building block of mobile commerce – for any m-commerce transaction there must be a way to pay.

Over the past years, there have been numerous reports predicting huge growth of mobile payments as there is an enormous potential with 1.7 billion of mobile phone users in the world (mForma, 2005). Arthur D Little's report predicts the volume of m-payment transactions to be worth $37.1 billion in 2008 (Armitt, 2004). Mobile phones possess a number of features that could make them an ideal payment device: they are small, personal, familiar, and with their own display, input, and various connectivity options. Most importantly, many people never leave home without them.

Despite the potential and expectations, the uptake so far has been disappointing. Mobile payments have not reached the expected adoption levels. There is still much work needed before mobile payments become truly successful worldwide, and widely adapted by consumers. Establishing success factors therefore is an important research goal and underpins the work of the authors.

The significance of such research that aims to improve success of mobile payments is evident. According to Smart Card Alliance (2005), a mobile payment application could attract new customers for mobile operators, reduce customer turnover, and add revenues from data services related to payment. Financial service providers could offer new, differentiated payment services to their customers and increase their credit and debit card transaction volume. Merchants can benefit from faster transactions and improved customer convenience. Customers would gain a new, better way to pay.

2. THEORETICAL FRAMEWORK

Traditionally, in literature, acceptance models have been used to explain adoption of information systems. Numerous acceptance models have been utilized and validated on many occasions. Adoption literature reveals that the models used include Rogers's (1995) Diffusion of Innovation (DoI), Moore & Benbasat's (1991) Perceived Characteristics of Innovating (PCI), and a number of behavioural models: Fishbein & Ajzen's (1975) Theory of Reasoned Action (TRA) , Technology Acceptance Model (TAM) by Davis (1989), and Theory of Planned Behaviour (TPB) proposed by Ajzen (1991).

Researchers have also developed hybrid models that have unified existing acceptance theories to draw from their best features: Decomposed Theory of Planned Behaviour (TPB), and Unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh et al. (2003). A more detailed explanation of these models is beyond the scope of this paper, however an excellent overview of such models and their suitability to mobile payments is provided by Mallat (2004).

A common feature of the abovementioned models is their focus on characteristics of new technologies (innovations) that the user perceives. Such models propose specific factors, for example ease of use, usefulness, or compatibility that a new technology must have to become widely adopted by users. Some of these models also take into account the effect of characteristics of the user - such as gender, age, or experience with similar systems.

Damsgaard & Gao (2004) however argue that in more complex, networked technology, these models do not provide enough explanatory power. In their study of mobile telecommunications market, the authors observe that the presence of desired adoption characteristics in the service is not enough to explain successful diffusion of innovations.

According to their theory, what is missing in the traditional models is the discussion of infrastructure traits of an innovation. The existing acceptance models focus on end-users only, but not on other key players. Infrastructural features of new technology are not taken into account in traditional models. The authors of this theory argue that apart from traditional user acceptance studies, researchers also need to focus on such issues as roles of other stakeholders in promoting innovation, social network around the technology, business models, role of institutions such as legislative and regulatory bodies, or effects of network economics (the value of new technology increases with the number of adopters).

This study attempts to evaluate this proposition to the mobile payments field. There have been some studies on mobile payments using traditional acceptance models, such as TAM or UTAUT (including the authors' research). If the innovation diffusion framework proposed by Damsgaard & Gao (2004) is shown to apply to mobile payments field, this does not suggest that the traditional acceptance models should not be studied and applied to mobile payments. Customer-centric adoption studies are still a valuable and necessary analysis tool. This would rather suggest that researchers need to be aware that the very useful acceptance model studies provide just partial explanation of mobile payments success or the lack of it, and there is also a need (possibly in combined studies) to focus on infrastructure innovation theories.

It seems that in the mobile payments context, this additional dimension, proposed by Damsgaard & Gao (2004) for mobile telecommunications services, can prove to be valid as well. The traditional models were better suited to organizational context where an innovation was introduced by management, and the adoption by individual employees was measured. Mobile payments in their everyday life domain are different. They are more complex than new IS in organizations, as key players include mobile operators, banks, and third-party providers, who do not necessarily work together. There are more regulatory and legal issues that need to be taken into account. There is a huge diversity of mobile devices, which indicates the importance of standards. Network effects may have an important role in mobile payments, as the more customers use the system, the more merchants adopt it; this in turn provides more value to each user.

An empirical study has been used to measure the validity of these assumptions. Forty-six (46) experts that represented various key stakeholders were asked to draw from their experience and explain reasons for the lack of success of mobile payments. This paper reveals whether the issues discussed by the experts indeed cover not only the characteristics of mobile payments systems that affect individual users' adoption, but also the infrastructure traits necessary for success. Furthermore, the study outlines which factors specifically matter in mobile payments success, from both perspectives. Section Three describes the research methodology and section Four provides an analysis of the results. Section Five presents the proposed holistic

model for m-payment success factors studies while section six provides a conclusion and points the way to further research.

3. RESEARCH METHODOLOGY

The study draws on the expertise of people involved in mobile payments projects. 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 success of mobile payments, and the most critical issues that need to be tackled so that 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 (Gorman & Clayton, 2005). Unlike in 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 not only makes it possible to gather a variety of perspectives on the research problem, but it also enhances credibility of the data that can be confirmed by several sources. Purposive sampling aims to create rich, in-depth information (Liamputtong, 2005).

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, extensive review of literature was conducted, focusing on the most relevant conferences, including Mobility Roundtable, MOBIS, and International Conferences on Mobile Business. Access to other references was gained by using IEEE Explore, Proquest, and other academic databases. The most relevant journals included International Journal of Mobile Communications, and Mobile Information Systems. 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. Their experience with practical solutions was hoped to help reveal a number of issues and challenges that they have to cope with. Such stakeholders were likely to know exactly what it is that hinders successful diffusion of mobile payments. The companies were identified using search engines and relevant portals.

The forty-six (46) 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 the barriers to success in mobile payments, and what is necessary for the success to happen. Many participants not only provided rich, in-depth responses, but also agreed to be contacted with further questions.

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 (Liamputtong, 2005). 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 in this research 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. It also meant that different time zones were not a problem, since the respondent could fill in surveys at any time. It also provided the respondents with more convenience. More importantly, some of the contacts preferred to provide their answers anonymously, and the web survey was a way to ensure this. The selected stakeholders were emailed the link to the survey with an invitation to participate.

During data analysis, a procedure proposed by Pare (2002) was applied to ensure the reliability of the coding process, and therefore the reliability of this study. Two coders individually assigned the issues discussed by the respondents to a suitable category. The results were subsequently compared, and the few differences discussed and resolved.

Furthermore, a strategy suggested to promote validity of qualitative research such as this one is using low inference descriptors, which are description phrased very close to the participants' accounts and researchers' field notes (Johnson, 1997). 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.

4. ANALYSIS OF THE RESULTS

4.1 Traditional User Acceptance Factors (Technology Features)

A number of factors discussed by the respondents included technology's characteristics, which are the basis of traditional acceptance models. Security and trust issues, lack of ease of use, limited usefulness, and cost were seen as the main barriers preventing success of mobile payments.

Security/Trust

Security of mobile payment solutions needs to be increased in order to increase their adoption. Problems reported included "*lack of trust*", "*user security not being up to scratch*", "*consumer's fear of a lack of security*", "*perceptions of security and trust*", "*trust and risk issues, especially in consumer sector*", and "*maintaining data integrity*". Customers are reluctant to "*pay with a device they consider less secure and affordable than Internet (or a wallet)*". For mobile payments to be successful, we must "*find out how can we replicate (and improve on) the 'good' features of money in the mobile payments environment*". Security measures are necessary to ensure that "*no one can use my payment account (i.e. use my funds)*." Customers need to believe that the system is secure - what matters to one expert is "*customer psychology - people need to feel confident that their form is a secure way to make payments*". Trust also has a broader sense, as "*probably the primary concern is all about confidence - confidence in security of personal information, and confidence in the capabilities of the technology to deliver reliable and accurate results.*" The problem specific to mobile payments is that there is "*limited capacity of providing evidence like receipts and other physical things the people are used to*". Developing a system and brand that people will trust is a necessary determinant of success.

Security or trust factors are missing in traditional acceptance models. Some researchers in fields related to mobile payments however have expanded traditional models with this construct, validating it in their empirical studies. Gefen et al. (2003) proposed trust as another factor in e-commerce adoption. Serenko & Bontis (2004) used trust in their mobile portals adoption study. Constantiou et al. (2004) propose that security is one of success determinant for mobile data services. Based on the participants' responses, this seems to be an important success factor in mobile payments as well.

Ease of Use

Ease of use and convenience were seen as necessary conditions for success. The issues discussed included general "*problems in usability, ease of use, speed, etc*", "*usability*", "*convenience*", as well as the necessity for a solution that would be "*easy to use, cheap, and versatile*". A success determinant is "*developing a system which is simple and people can understand and use it*". As one respondent sums it up, a barrier is "*ease of use of the feature - they are sometimes just complicated*".

Mobile payments are believed to be "*not convenient and easy enough comparing to other payment methods*". Specifically, inability to type on small keyboards was mentioned, and it was noted that "*using the keypad on a mobile phone, it is very cumbersome to go through the login procedure as well as the actual mobile payment procedure*". Another important factor for lack of adoption was "*poor user interfaces that don't follow the workflows of other channels*". As one participant concludes, "*produce a scheme which is easier/cheaper/safer/faster or whatever than the stuff we've had for hundreds of years!*".

The findings from this survey fit in exactly with the existing theories of adoption, such as the Perceived Characteristics of Innovation (Moore & Benbasat, 1991), the Technology Acceptance Model (Davis, 1989), and the Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003), which all place ease of use of a new technology as a necessary factor for its adoption.

Usefulness

Traditional acceptance models often include criteria relating to usefulness of the new technology, i.e. how it fulfils customers' needs and provides additional value. The respondents also realized the importance of this factor. One expert argues that "*if you look to the UK experience of Mondex (a stored value cash card) this failed because it didn't give the consumer anything*". Other respondents claim that "*for applications outside mobile commerce, there is no real need to replace existing means of payment*", and similarly, "*no need for m-payments in the offline world*".

It seems that existing m-payment systems "*don't offer any advantages over existing forms of payment, especially credit cards and cash, so people won't see any reason to switch to them*". Another respondent holds a similar view: "C*ash and cards cover the majority of payment transactions: there may not be enough need for mobile payments to make the consumers familiar with using the m-payments and to make the m-payments profitable to merchants and service providers*". To sum up, an m-payment solution needs to "*bring more value to the merchants and the consumers, compared to existing solutions*".

Usefulness is one of the two original acceptance factors in TAM (Davis, 1989). Diffusion of Innovation (Rogers, 1995) includes the Relative Advantage criterion, too, and Performance Expectancy is part of the UTAUT (Venkatesh et al., 2003) model. Based on our findings, usefulness of a new mobile payment system seems to be a necessary condition for its acceptance.

Cost

Cost of mobile payments proves to be another factor affecting their adoption. The problem is "*high fees and commissions of the mobile payments for both merchants and consumers*". The important question is "*How much will the mobile payment service cost?*". As one participant explains, "*cost of these transactions is also an inhibitive factor*". Systems must have "*very low merchant transaction fees so that it is viable for micro-payments, such as ringtones, web content*". Cost both for merchants and customers was discussed in the study, as "*it is difficult to provide a low cost solution that will suit the largest number of mobile merchants. Critical to bringing down the cost to the user is the availability of viable technology*".

Cost has not been included as an acceptance factor in the original models, such as TAM, UTAUT, or Diffusion of Innovation. In mobile fields however the situation is different. Amberg et al (2003) did propose Cost as and acceptance factor for mobile data services, while Ling et al. (2004) added Financial Resources to the original TAM factors for mobile commerce. In mobile payments, cost seems to play an important role in their successful adoption, as revealed by the participants' responses.

4.2 Infrastructure Factors

The analysis of the participants' responses revealed that apart from the issues discussed in Section 4.1, there are also a number of concerns that do not deal with technology characteristics. These topics indicate that apart from the features that a new technology must have for a user to start using it, such as security, ease of use, usefulness, or cost, other success factors relate to the whole infrastructure that makes it possible and profitable to offer the technology to the user. These issues belong to the infrastructure perspective, and have been divided into sections according to some topics proposed by Damsgaard & Gao (2004).

Cooperation between Actors

The majority of issues reported by the respondents concerned 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*". Currently, this issue is believed to be a significant barrier to success, especially the "*behaviour of (potential) mobile payment service providers, especially mobile operators and banks*". There is also "*a lack of market support from network operators and financial institutions*". One respondent puts it simply: "*the main barrier to success in mobile payments is the banks and the telcos*". Another expert claims that "*the strong position of banks and credit card organisations, who rule the market, hinder success of new market entrants*".

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 grou*p". There is a need to "*demonstrate value for banks, telco and merchants so that they do not end up eating each others lunch*".

The findings illustrate that roles of various key players in promoting the diffusion of mobile payments need to be studied to ensure the success of such systems. The social network around the technology cannot be overlooked. Cooperation between the main actors is a necessary condition for an m-payment success.

Regulatory/Legislative Issues

Regulatory matters are another important issue. "*Regulatory questions (and the optimized behaviour to these)*" become an important factor. There is "*an absence of government/ regulatory authority support.*" The reluctance of governments may be "*due to un-traceability of fund transfer of some kind of payments*". There are regulations issues in specific regions, such as "*current political and bank business situation in the European Union*". Another regional issue is "*regulated market situation by different EU directives like ELMI (Electronic Money Institute) etc.*" Because of these issues, "*most m-payment schemes tried to adopt to the existing laws and marketing situations and don't care for the needs of their customer*s".

Another issue is that of "*liability within the system (customer, vendor, transaction processor, billing issuer)*". Legal issues need to be solved: "*the same way many new issues appeared with e-commerce, new laws had to be created or expanded or interpreted*" for mobile payments.

It seems important to analyse the necessary involvement of institutions in promoting infrastructure innovation and the market transformation in mobile payments. Such institutions involve legislative and regulatory bodies.

Business Models

The issue of "business models" has been brought up by a number of participants. "*Finding the right business mode*l" is necessary for widespread adoption. In mobile payments field, there exist "*complicated revenue models involving more than one business entity*". New business models need to be created for tangible products, as the existing business models for the sales of intangible products, like ring tones or games mean that "*the carriers are used to have a profit margin that is totally unrealistic for tangible products (i.e. 50% of the transaction).*" Another third-party provider from Australia notes that the "*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 channe*l".

Finding the most suitable business model for mobile payments seems to be one the crucial success factors and an important research question.

Network Externalities

Another significant problem is "*low acceptability and use of the current mobile payment solutions among merchants and consumers*". "*It is a 'network' challenge, that until there is critical mass of users and merchants and network capability and then trust, then it will not take off.*" Moreover, "*payment platform needs to be supported by enough merchants to enable critical mass of user in order that the payment system is viable".* Another respondent observes that it is "*the chicken and egg problem: how to manage the network externalities or lack of them in mobile payment diffusion process*". Coverage is a necessary success factor, as is "*what can I buy with m-payment. If the service does not have coverage, it will be next to useless".*

To sum up, "*you need to persuade a huge number of buyers and a huge number of sellers to all adopt the same mechanism. What you really have is an eMoney System that replaces cash. It took centuries for cash to become accepted. You need to reach that level of acceptance*".

Finding ways to manage such network externalities in mobile payments is an important research challenge that can greatly improve mobile payments diffusion.

Standardization

Another issue brought up in the study was the lack of "standardization". Standards concern cross-industry business issues and possibly policy issues in some countries. "*Standard protocols and standard mobile*

devices" would make mobile payments success easier to achieve. What is needed is *"standardized processes, as occurs today in credit card payments or in ATM withdrawals: it's always the same steps no matter where you are".* Standardization could help *"achieve a seamless ecosystem".* Clearly, *s*tandardization issue should not be overlooked by researchers studying success factors of mobile payments.

5. MULTI-PERSPECTIVE FRAMEWORK

This study has shown that the broader framework proposed for analysing success of mobile telecommunications market by Damsgaard & Gao (2004) applies to the mobile payments field as well. System providers and other stakeholders in our study clearly believe that barriers to success of mobile payments belong to both perspectives, so to discover success factors in mobile payments both user adoption criteria, and infrastructure traits need to studied.

As the respondents' responses revealed, the user adoption perspective concerns not only customers, but also merchants who need to start using the new m-payment system. When the adoption factors are discovered, it seems important to look for ways of fulfilling them with available technologies. In the infrastructure perspective, important research questions include ways of collaboration between key players, regulatory and legislative issues, successful business models, managing network effects, as well as standardization challenges.

Damsgaard & Gao (2004) further recommend that research should aim to examine the interrelation between the two perspectives' determinants, and how they co-depend. The model in Figure 1 represents the specific issues that need to be studied in both perspectives; furthermore, it also depicts this possible interrelation and co-dependence of the individual issues, combining them in one holistic framework.
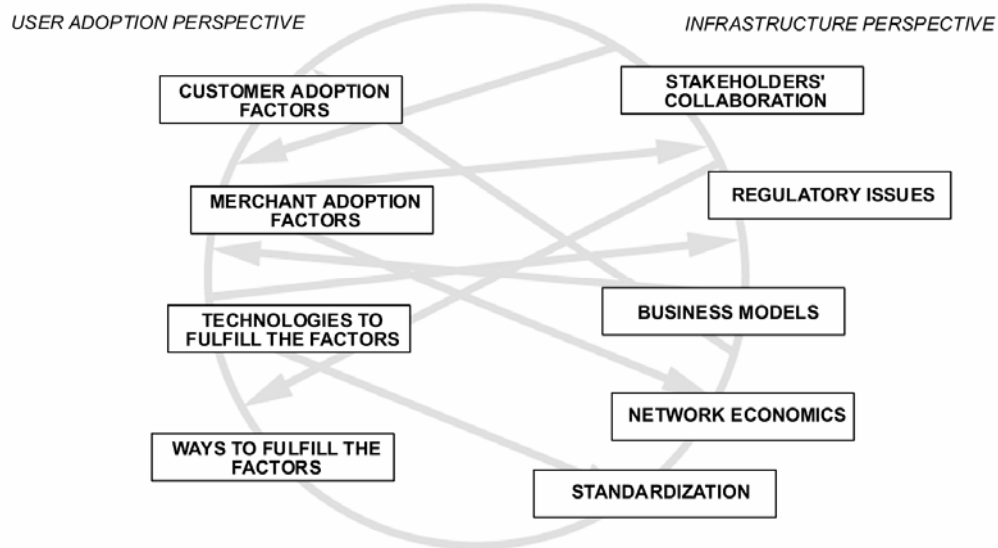

Figure 1. Multi-perspective framework for mobile payments success studies

6. CONCLUSIONS

This study has revealed that a broader framework is necessary to analyse the success of mobile payments. Our qualitative research, based on the experts' experience, confirmed that success of mobile payments is determined by both a) technology features affecting potential users' decisions to use or not use the new service, and b) other success determinants concerning the infrastructure. A quantitative study could be used in the future to either confirm or augment the proposed framework. As represented in Figure 1, future research needs to focus on factors affecting individual users' and merchants' adoption of mobile payments, as

well as on ways to fulfil the factors; furthermore, ways of collaboration between key players, successful business models, regulatory and legislative issues, standardization challenges, as well as managing network effects need to be studied as well. Either the two perspectives could be combined in further studies, or researchers need to be aware of the findings and challenges in the other perspective while focusing on one of them. Research should also aim to examine the interrelation between the two perspectives' determinants. Further studies should therefore focus not only on the success issues, but also on linkages between them, and how they depend on one another.

Both perspectives are believed to be equally important, as even if the service is easy to use, useful, secure, and able to meet customer's needs, it will not last if regulatory matters are not solved, revenue models do not provide value to stakeholders, and network effect is not fulfilled; on the other hand, even the best business models and successful partnerships will not be enough if the technology lacks the desired features, and the customer will not be willing to use it. Future research clearly needs to focus on both perspectives. Further studies should also aim to discover how mobile payments user adoption influences growth of infrastructure innovation, and, at the same time, how infrastructure innovation influences the service characteristics that increase individual users' adoption.

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