

# Mobile Payment Market and Research – Past, Present and Future

Tomi Dahlberg, Niina Mallat  
Helsinki School of Economics

Jan Ondrus  
Ecole des HEC, University of Lausanne  
Agnieszka Zmijewska  
University of Technology, Sydney

## Abstract

The mobile payment market is currently under transition with a history of numerous tried and failed solutions and a future of promising but yet uncertain possibilities with contactless RFID and other new potential technologies. At this point of the development we take a look at the current state of the mobile payment market, review prior literature on mobile payment services, analyze the different factors that impact the market, and give directions for future research on this still emerging field. To facilitate the analysis, we propose a framework of four contingency and five competitive factors, and organize the contemporary mobile payment research under the proposed framework.

*Keywords:* Mobile payment systems, mobile payment research, literature review

## 1. Introduction

Mobile phones have transformed telephony during the past 15 years. As devices, mobile phones have for a long time been equipped with functionalities which far exceed the needs of telephony, and have inspired the development of value added mobile services, the use of mobile phones as access devices, and mobile commerce in general. These developments open very lucrative opportunities to merchants and service providers. There are more mobile phones than any other device that can be used to market, sell, produce or provide products and services.

Purchased products and services have to be paid for. Initially, fixed line telephony billing systems were modified to charge mobile telephony and other mobile services as such services emerged. The deployment of (mobile) telecom billing systems is still the most typical way to charge for mobile commerce transactions. However, payment services based on billing systems have several limitations. These include high payment transaction fees, merchant and service provider complaints about unfair revenue sharing, and necessity to provision services to billing systems with limited roaming of mobile commerce transactions between mobile networks. In some areas, such as European Union, payment services to third parties require a (limited) credit institution license. Lack of suitable payment instruments has for a long time been regarded as a factor that hampers seriously the development of mobile commerce.

In late 1990s and early 2000s mobile payment services became a hot topic and remained so even after the burst of the Internet hype. Mobile payments attracted also researchers, e.g., Dahlberg et al. (2003a; 2003b), Ondrus and Pigneur (2004), Pousttchi (2003), and Zmijewska et al. (2004b). Hundreds of mobile payment services as well as access to electronic payment and Internet banking were introduced all over the world. Strikingly many of these efforts failed. For example, most if not all of the dozens of mobile payment services available in EU countries and listed in the ePSO database in 2002 (Carat, 2002) have been discontinued. The difference to the rapid diffusion of the Visa Electron smart card or eBay/PayPal is striking. Why have Visa Electron and PayPal succeeded in where mobile payment services failed?

One answer could be that mobile technologies were not sufficiently mature and easy to use and therefore failed to attract consumers, merchants and banks. Now there seems to be a new wave of interest towards mobile payment services inspired by the above described needs and new technology based innovations, especially contactless vending and ticketing, and RFID (radio frequency identification).

Before new mobile payment services are launched, it is important to understand what previous studies have discovered about the acceptance of mobile payment services and about mobile services markets, and also what issues have remained unanswered. In line with Zmijewska and Lawrence (2005) we propose that multi faceted answers are required to answer questions such as why mobile payment services have not diffused, or what the impacts of various mobile payment services market factors on the development of these services are.

The aim of this paper is to summarize findings from past mobile payment services market research, and to suggest venues for future research. This is done with the help of a proposed framework. The main contributions of our paper are the framework itself, and the ability of the framework to compress findings of mobile services adoption, strategy and business models, security and trust, and other studies, as well as its ability to propose meaningful venues for future research. By using the framework, existing findings can be better understood and applied, both by industry when implementing their practical solutions, and by researchers studying mobile payments. The framework not only helps to explain the existing body of knowledge in each framework category, but it also provides a "big picture", or an overview, illustrating how the various perspectives fit together. It also reveals the gaps in literature, and therefore indicates what future research needs to focus on.

## **2. Context of the study - mobile payment services market**

Mobile payments are payments for goods, services, and bills/invoices with a mobile device (such as a mobile phone, smart-phone, or Personal Digital Assistant) by taking advantage of wireless and other communication technologies (such as mobile telecommunications networks, or proximity technologies). Mobile devices can be used in a variety of payment scenarios such as payment for digital content (e.g. ring tones, logos, news, music, or games), concert or flight tickets, parking fees, and bus, tram, train and taxi fares, or to access and use electronic payment services to pay bills and invoices. Payments for physical goods are also possible, both at vending and ticketing machines, and at 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 (Antovski & Gusev, 2003; Ding & Hampe, 2003b).

A mobile payment service comprises of all technologies that are offered to the user as well as all tasks that the payment service provider(s) perform to commit payment transactions. As Figure 1 shows a mobile payment service may include several parties. Many issues such as the power and the interests of the parties, legal and regulatory environment, and payment culture impact the orchestration of technologies and tasks into a mobile payment service.

A mobile payment as any other payment is carried out by using a specific payment instrument such as cash, credit card, or mobile phone wallet. In addition to pure mobile payment instruments, most electronic and many physical payment instruments have been "mobilized". Payments fall broadly into two categories; payments for purchases and payments of bills/invoices. In payments for purchases mobile payments compete with or complement cash, checks, credit cards, and debit cards. In payments of bills/invoices mobile

payments typically provide access to account based payments such as money transfers, Internet banking payments, or direct debit assignments.

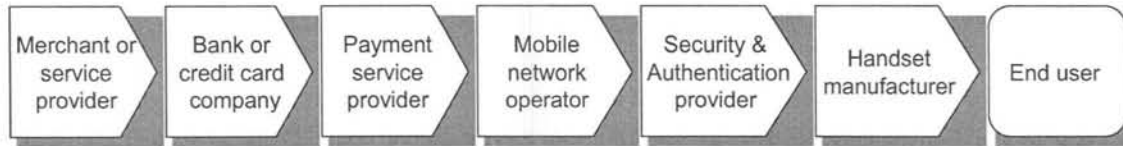


Figure 1. Potential parties in the mobile payment service value chain

To conclude; when the mobile payment services market is investigated it is important to keep in mind that many contingency and competitive factors impact this market, and that mobile payment services compete with advanced physical and electronic payment services. To succeed, mobile payment services have to be competitive with other payment services in all payment situations, with the exception of genuine mobile services, where mobile payment services are a natural choice. For these reasons a multi faceted framework is needed to describe both the mobile payment services market and research regarding this market.

### 3. Research framework

As section 2 indicates, there are a number of factors which impact the success of a new payment service. To describe the relations between these factors, we deemed it necessary to create the framework shown in Figure 2. The framework is modified from (Dahlberg & Mallat, 2002; Javalgi & Ramsey, 2001; Jayawardhena & Foley, 2000).

Jayawardhena and Foley (2000) proposed that changes in technological, cultural, commercial and legal factors together with the competitive forces of financial services market drive financial services development. Javalgi and Ramsey (2001) postulated that information technology and telecommunication, social/cultural, commercial, and government/legal factors impact the diffusion of global eCommerce. Dahlberg and Mallat (2002) applied these two generic models to describe factors that impact mobile payment services diffusion. We made slight modifications to their model, so that the resulting framework better describes the mobile payment services market. The word legal is replaced with legal, regulatory, and standardization which better describes the sources of norm changes that impact the mobile payment services market. Other similar wording modifications are the replacement of retailer power with merchant power (supplier power), customer power with consumer power (buyer power), and the division of alternative payment services into traditional payment services (barriers to entry) and into new e-payment services (substitutes). The resulting framework thus incorporates contingency factors with the five force model of Porter (1998).

Four of the framework factors, that is, technological, social/cultural, commercial, and legal/regulatory/standardization are beyond the control of individual market participants. These factors are contingency factors. Other five factors are competitive factors describing the main competitive forces of the mobile payment market. More detailed explanation of each contingency and competitive factor is provided at the beginning of sections 5-6, which summarize research in each specific category.

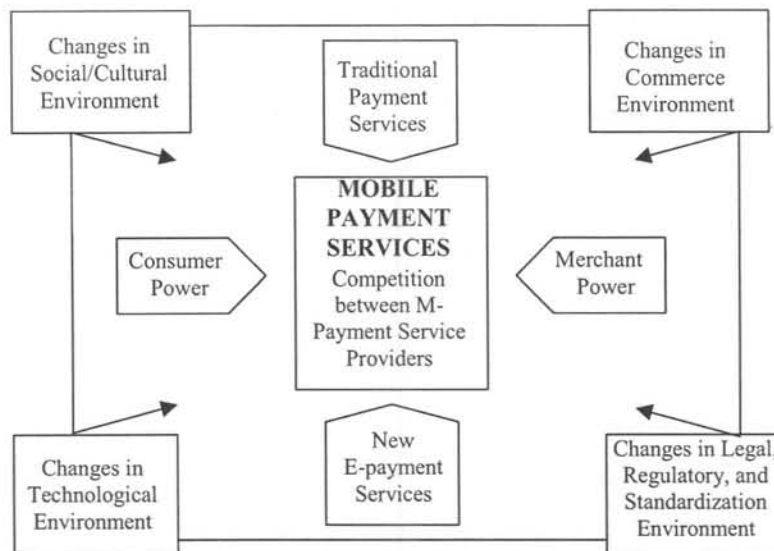


Figure 2. Framework of factors impacting the mobile payment market

We use the framework as a meta-model, which provides an overall view to the literature and to the diverse viewpoints that can be taken when studying the mobile payment market. We postulate that the framework is useful in describing the mobile payment services market because: (1) It is conceptually sound and drawn from previous research. (2) It brings clarity to the multiple topics and to the vague, conflicting terminology present in professional and academic mobile payment literature. (3) It shows clearly what factors impact the mobile payment services market and services development, another issue in need of clarity.

#### 4. Methodology

To determine the current state and future directions of mobile payment research, we conducted an extensive literature search on published papers on the topic. As mobile payments are still a new and emerging research area, most of the contemporary research is published in conference proceedings. Therefore, to compile a comprehensive bibliography on mobile payment research, we included in our search academic journal papers as well as conference proceedings and book chapters. The following online academic databases were searched:

- ProQuest Direct
- EBSCO Business Source Premier
- ScienceDirect
- IEEE Xplore
- ACM Digital Library
- Google Scholar
- M-lit online bibliographical database dedicated to mobile business literature

The literature search was based on the descriptors “mobile payments”, “m-payments”, and “wireless payments” that were to be found on the title or abstract of the paper. We excluded papers where mobile payments were not the main topic of the paper but a minor section of an overall research on mobile commerce or e-payment systems.

All the authors of this paper have been actively researching various mobile payment issues for the past several years and one of authors worked a number of years as an executive vice president for banking and telecommunications industry. Our experience on research and practice of mobile payments field ensured our familiarity with both existing work and the sources that needed to be taken into consideration.

The search resulted in 97 papers, which were published between 1999 and 2006. Of the papers, 72 were published in conference proceedings, 19 in journals and 6 in textbooks. Figure 1 below shows the amount of papers published each year excluding 2006, which is still ongoing. The number of m-payment publications has increased steadily until peak year of 2004 after which there was a slight decrease in 2005.

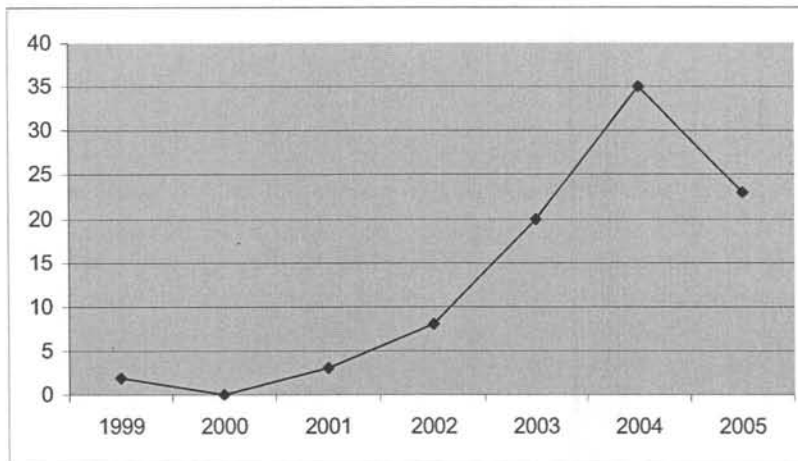


Figure 1. Mobile payment papers published in 1999-2005

The most researched categories in our framework are technological environment, consumers, and the central dimension that includes research on m-payment market in general, m-payment services and providers, and market rivalry. Some papers examined issues in more than one dimension. The least studied dimensions were social/cultural environment and competition between m-payments and new e-payment services. We found no papers that would have specifically addressed these issues. Table 1 shows the number of papers that discuss topics within each of the framework's categories.

Table 1. Number of papers by research framework categories

Categories in the research framework	No. of papers
<i>Outer Dimensions</i>	
Social/Cultural	0
Commercial	6
Technological	48
Legal/Regulatory/Standardization	6
<i>Inner Dimensions</i>	
Consumers	22
Merchants	6
Traditional payment services	5
New e-payment services	0
M-payment service market and providers	21



In the following sections we discuss relevant review findings within each of the different dimensions of our research framework, identify areas which have not yet been addressed, and give directions for future work.

## **5. Mobile payment environment analysis – contingency factors**

The four outer dimensions of our research framework describe factors that are external to the mobile payment business environment, and thus outside management control. They include changing social/cultural, commercial, technical, and legal/regulatory environment. The four factors are likely to have a significant impact on the business, and therefore the ability to understand, explain, and predict these factors is important for both researchers and managers (Jayawardhena & Foley, 2000).

### **5.1 *Changing social and cultural environment***

Changes in people's social and cultural environment easily affect their consumption habits, buying behavior, and thus their need for new payment systems. Examples of these changes include changing payment cultures and lifestyles, greater mobility of people, and increased appreciation for leisure time. Our literature review did not reveal any academic papers that would have investigated the effects of social and cultural changes on mobile payment demand and development. Relevant research reports and studies on related fields are discussed below to provide suggestions for future mobile payment research on this dimension.

One study that analyses the influence of culture on development of payment systems was performed by Bohle and Krueger (2001). The authors pointed out that mobile phones are used to a much smaller extent in the US than in Europe. They also identified clearly distinguishable payment cultures within Europe, for example the debit orientation in Germany, or the determining smart card tradition of French banks. Other cultural factors that can influence what payment services are offered and how they are adopted include industry strengths, home-banking affinity of consumers, or strong mobile phone inclination. Common trends can be also based on neighborhood and shared cultural patterns among countries. The preference of payment instruments chosen at the real Point-of-Sale (POS) clearly influences the preferred payment method at the virtual POS.

Another comparison between mobile payment in Europe and the U.S. was performed by (Huber, 2004). His qualitative study indicates that differences are well grounded by the adoption of mobile technologies, the different payment habits of customers, and the stronger involvement of the banking industry in Europe.

Many other cultural factors could be studied in relation to mobile payments as well. For example, Sundqvist et al. (2002) explored the effects of country characteristics, cultural similarity and adoption timing on the diffusion of wireless communications. Another study (Mahmood et al., 2004) examined the influence of culture on online shopping behavior. Factors that were discussed included demographics and lifestyle characteristics, or cultural variables in developed and developing countries.

### **5.2 *Changing commercial environment***

Changes in the commercial environment include the development of Internet and mobile networks into commercial channels, and the increasing automation and self-service orientation of payment services. Such changes in commercial transactions create needs for new or enhanced payment services and drive their development. Mobile payment research in

this dimension looks at how business practices have changed, and how these changes facilitate/necessitate the introduction of mobile payments

Ondrus & Pigneur (2005) used several qualitative interviews with key Swiss experts in the field to analyze two possible disruptions of the mobile payment market - a possible sliding from the current e/m-payment cards initially introduced by financial institutions to the newly designed mobile phone schemes involving mobile operators; and a possible switch from an integrated market driven by dominant actors to a self-organized market where mobile payment solutions are offered by intermediaries and newcomers.

Another study (A. Zmijewska & Lawrence, 2006), based on the results of a web-based qualitative survey, revealed how each of the key stakeholders (operators, banks, and third-parties) could affect the development of mobile payments. Currently, the lack of agreement and cooperation between the players seems to hinder the development of m-payments. The conclusions suggest that successful mobile payments solutions will be based on strong partnerships between the main stakeholders.

Similar findings were confirmed by Lawrence et al. (2005) in their case study research of three Australian companies. Their interviews revealed that the main reason for the collapse of one of the studied m-payment service providers was the inability to successfully partner. The other two case studies also demonstrated that partnering with banks and mobile operators is vital for the success of these systems. Without such partners, mobile payment service providers are more likely to perish. Dahlberg and Mallat (2002) came earlier to a similar conclusion.

### **5.3 *Changing technological environment***

Development of wireless and other technologies facilitate the introduction of new or enhanced payment services, and drive the development of mobile payments. Research on this dimension analyses various technologies that can be used in new payment systems, and issues and challenges that they bring about.

Chen and Adams (2004) examined several short-range wireless technologies in terms of their use in mobile payments systems: Bluetooth, Infrared, RFID and Near Field Communication (NFC). The changing technological environment that influences new mobile payment offerings was also analyzed by Zmijewska (2005). This study explored the potential suitability of various networking technologies for providing the required features in mobile payments. The discussed technologies include 2nd and 3rd generation mobile networks, NFC, Infrared and Bluetooth. Ding & Hampe (2003a) also analyzed latest enabling technologies, comparing their technical features.

A new architecture for mobile payment system to improve business processes and increase customer loyalty was proposed by Ondrus and Pigneur (2004). To have a better understanding of the technologies in mobile payment, they proposed a three dimensional m-payment framework. 'Network' gathers the technologies used in a wireless network infrastructure, 'device' represents the user wireless infrastructure, while 'mobile application' describes the technologies used mostly by mobile application developers, mobile application service providers and content providers.

Some other studies have focused on one particular technology and its use in mobile payments, for example on Bluetooth (Pradhan et al., 2005), J2ME (Antovski & Gusev, 2003), or SET and KSL protocols (Kungpisdan et al., 2004b).

Mobile payments security has been the focus of discussions of network technologies by Schwiderski and Knospe (2002), Me (2003), and Nambiar et al. (2004). Karnouskos et al. (2004) described how security, trust and privacy are tackled in their proposed system, SEMOPS.

Some other studies that have focused on changing technological environment include sound-based mobile payment system (O. Lee, 2004), modeling of policy-based mobile payment (Kim, 2004), mobile-to-mobile payment system (Das et al., 2005), accountability logic for mobile payment protocols (Kungpisdan et al., 2004a), as well as a general layered framework and a new process for mobile payment (Zheng & Chen, 2003).

In addition to academic literature, there is a vast body of commercial and market research literature on various aspects of mobile payment (enabling) technologies.

#### **5.4 Changing legal, regulatory, and standardization environment**

Changes in the legal, regulatory and standardization environment describe changes in jurisdiction, regulations and in other norms with requirements to comply that create needs for new or enhanced payment services and drive the development of mobile payments. This category has not been researched extensively in the mobile payments field.

Rawson (2005) discussed the regulatory issues in mobile transactions between different EU countries. His article concludes that mobile transactions between different countries are increasingly complex due to a complicated web of law and regulation but may be clarified by unifying regulation such as EU directives.

Using the case studies of numerous developing mobile payments consortia, Lim (2005) discussed the process of standard setting for mobile payments, and the importance of standards in the field.

Lawrence and Lawrence (2004) reviewed the impact of attacks on the wireless communication systems in a legal and security context with a view to formulating technical and legal policy suggestions. To assist in addressing these problems, the researchers presented a modified Mobile Enterprise Security and Legal (MELS) Framework. A similar study could reveal legal questions, as well as frameworks for dealing with them in the mobile payments field.

### **6. Mobile payment market analysis – competitive factors**

The five inner dimensions of our framework describe the main competitive factors in the mobile payment market. The factors include consumer power, merchant power, traditional payment services (barriers to entry), new e-payment services (substitutes), and mobile payment service providers. These different players are in the center of mobile payment market development and their behavior and relative powers determine how the market is shaped.

#### **6.1 The consumer power**

Consumers create a specific demand for a mobile payments solution and drive its success by adopting and using it. In other words, the success of a mobile payments solution depends on the number of participants and the volume of transaction. The potential threat of customer churn could enable some pressure on mobile payments service providers to design a solution that fulfills consumers' needs and satisfies them. However, consumers do not necessarily have a direct influence on the providers at an early stage of development. This is evident from previous payment instruments that were introduced to the market without an expressed demand from the consumers. For instance, debit cards were brought to the market to limit the number of customers going to bank tellers to withdraw cash. This was mainly done to improve the business processes and reduce the costs of banks. With limited consumer influence in the early development stages, the risks of solution's failure increase.



A certain amount of research has been done to study the adoption factors of consumers. This research was mostly based on TAM (Davis, 1989) with additional constructs adapted to study mobile payments such as security, cost, trust, mobility, expressiveness, convenience, speed of transaction, facilitating condition, attractiveness of alternative, privacy, system quality, and technology anxiety (J.J. Chen & Adams, 2005; Cheong et al., 2004; Dahlberg et al., 2003a; Dahlberg et al., 2003b; Dewan & Chen, 2005; C.-P. Lee et al., 2004; Mallat, 2004; Mallat & Dahlberg, 2005; Valcourt et al., 2005; A. Zmijewska et al., 2004b).

On their side, Dahlberg et al. (2002) also combined three different theories (i.e. Customer perceived value (Grönroos, 1997), TAM (Davis, 1989), and network externalities theory (Shapiro & Varian, 1999)) to study mobile payments adoption.

To propose a classification of mobile payments solutions, Zmijewska et al. (2004a) introduced a user-centric model based on features that are apparent to consumers. The purpose of the model was also to discover more about consumer's acceptance motivations and preferences.

Using the results of a survey done in Germany (Khodawandi et al., 2003), Pousttchi (2003) presented some essential conditions for acceptance and usage of mobile payments (i.e. security, costs, convenience, and functionality requirements). Based on the same idea, Valcourt et al. (2005) conducted a survey on the interest of 130 youths in mobile payment for a movie ticket purchase service. The main results were that 76% of the respondents would be interested in buying movie tickets with a mobile phone, and 78% would use a service whereby their buying transactions would be charged on their mobile carrier bill.

In order to launch an adapted and therefore successful mobile payment solution, it is crucial to study and understand these adoption factors. This has been relatively well explored by many researchers. However, to the best of our knowledge, there is still a lack of research concerning the pressure the consumers can put on the mobile payment providers.

## **6.2 Merchant power**

Merchants<sup>1</sup> have an important role in the development of payment services. They create the market for financial institutions and other payment service providers. Some payment solution failures were explained by the lack of merchant involvement in development and deployment. Their active participation in promoting a payment solution is crucial to consolidate a large number of points of acceptance. The merchant power should not be underestimated as they could decide to altogether reject a payment scheme that would not suit them (e.g. high commission fees). A consortium of merchants could have a significant bargaining power against mobile payment service providers.

Another important aspect to take into account is that merchants could become mobile payment service providers themselves. In fact, some merchants already operate their own payment solutions in industries such as public transportation (e.g. Octopus in Hong Kong), and retail (e.g. IKEA card), among others.

Some studies have analyzed the potential risk of merchants becoming mobile payment service providers (Ondrus & Pigneur, 2005; Ondrus & Pigneur, 2006b). Other research has been done to understand the adoption factors of merchants (Mallat & Dahlberg, 2005; Mallat & Tuunainen, 2005; Teo et al., 2005). The power of the merchants could be further studied in order to better understand their role in the mobile payment market.

---

<sup>1</sup> We use "merchant" as a generic term to describe various kinds of merchants and service providers

### **6.3 *The traditional payment services***

Traditionally speaking, the more popular modes of payments for purchases are cash, checks, debit and credit cards. In Europe, there is still a strong preference of using cash over cards with the exception of Scandinavian countries. Conversely, in North America, cards are accepted for any type of purchase (i.e. micro and macro payments). The trend of payment process digitalization started partly with the demand for a payment instrument to support electronic commerce. A similar trend to more electronic payments modes is visible also in payments for bills/invoices lead by Internet banking/payments, e-invoices, and e-direct debit/credit assignments.

Today, with the development of mobile services and mobile commerce, there is a demand for mobile payment services. A current issue that remains to be solved is how traditional payment services could be adapted for this new demand. Some trends indicate that mobile phones are just a new channel for current card- and account-based systems. However, there is still a risk that the creation of a mobile payment market threatens the current payment schemes as newcomers could enter this market (e.g. the mobile network operators).

Some research has been done to evaluate the disruptive potential of mobile phones against cards (Ondrus & Pigneur, 2005; Ondrus & Pigneur, 2006a). Based on their findings, Ondrus and Pigneur could confirm that cards were still preferred to phones for payments in the Swiss market. On their side, Chou et al. (2004) evaluated various payment technology alternatives using technological, economic, and social factors. The results showed that payments charged to the telecom bill were the least preferred alternative. Other studies indicate that mobile services and payments are used to complement, not replace, existing ones (Mallat et al., 2006).

### **6.4 *New electronic payment services***

When electronic commerce created a demand for electronic payment services, financial institutions brought to the market new services based on their existing card- and account-based schemes. However, due to security and privacy issues, some intermediaries such as PayPal, Peppercoin, Paystone and others seem to have succeeded in fulfilling the needs of the online merchants and consumers, as the current credit cards schemes were not well adapted for micropayments. Therefore, a new generation of payment providers emerged to complement, rather than compete with, existing schemes.

No papers found in our review discussed the position of or competition between mobile payments and new e-payments. Some research has been done to survey, describe and classify alternative payment schemes (Carat, 2002; Weber, 1999; Yu et al., 2002). Plouffe et al. (2001) conducted a comparative study of the consumer and merchant adoption towards electronic payment schemes.

### **6.5 *The rivalry in the mobile payment service market***

At this time, there is still uncertainty as to whether or not the adoption and use of mobile payments will prevail; these questions are primarily due to the lack of standards and immaturity of the market. Financial institutions and mobile operators are trying to overcome these issues by launching isolated initiatives to respond to current specific market needs. One consequence of this is that collaboration between banks and mobile operators is limited, as both want to control most of the value chain so as to increase their revenue. However, current payment service providers will probably keep control of the payment process and mobile network operators will create the new channel by providing their mobile network

infrastructure. Some newcomers also propose mobile payment solutions where financial institutions and mobile operators are used only as tools to enable the service. This could be a threat for financial institutions if they do not monitor closely the development of such solutions.

Some research has been done about the competition or collaboration in the mobile payment market. However, the limitations of such research are important, as each national market is different in terms of its actors. Based on a qualitative study, Zmijewska and Lawrence (2006) reviewed strengths and weaknesses of potential mobile payment providers. Moreover, they discussed the possible role of each actor in different collaboration models. Ondrus and Pigneur (2005; 2006c) studied the possible threats caused by independents and newcomers in the Swiss mobile payment industry. One major finding was that collaboration between the stakeholders was preferred to competition. A survey and classification of mobile payment solutions was proposed by Karnouskos (2004). Moreover, Karnouskos discussed the different mobile payment models and their impact in terms of collaboration. A short subsection also depicts the existing consortia that are working on mobile payments.

## **7. Conclusions and proposals for future research**

The aim of our paper was to review prior research on mobile payment services to analyze the different factors that impact this market, and to give directions for future research in the emerging field. A framework with four contingency and five competitive factors was proposed and used to categorize the literature review.

**The contingency factors** in our framework represent external factors that are largely beyond the influence of the mobile payment market players. Based on the findings, we propose the following four directions for research concentrating on each of the contingency factors.

P1: Social and cultural factors are important determinants for the use of different payment instruments, diffusion of wireless communication, and online shopping behavior (Bohle & Krueger, 2001; Sundqvist et al., 2002; Mahmood et al., 2004). These factors include, but are not limited to, economic conditions within the country, payment culture, and culture's disposition to trust. As social/cultural factors are scarcely studied in mobile payment context, important directions for future studies include exploring how these factors influence the development and adoption of mobile payments, and how they can be managed to facilitate m-payments diffusion. Multi-cultural comparisons of payment cultures and preferences are also needed.

P2: The commercial environment of mobile payment market has so far been unstructured with lots of proprietary solutions competing with each other. Latest research suggests, however, that more cooperation and stronger partnerships are needed to facilitate the market development (Zmijewska & Lawrence, 2006; Lawrence et al., 2005). More research is needed, however, to identify the specific needs that electronic and mobile environments have for payment services and to examine cooperation strategies that enable sustainable service development for these markets.

P3: Changes and innovations in the technological environment have driven the development of mobile payments so far. This area is also extensively examined by academic literature (Antovski & Gusev, 2003; Kungpisdan et al., 2004a; Me, 2003; Pradhan et al., 2005). Yet many of the technological m-payment innovations have failed to attract customers or support profitable business models. Future research on the area could take a more holistic approach to technology development, and examine how and which technologies could better enhance customer experience or facilitate cooperation and cost-effective business models in

mobile payment market. A comprehensive view is needed as the marketing of payment services may fail due to overly technical orientation.

P4: One of the least studied factors in mobile payment market is the legal, regulatory and standardization environment, and its influence on mobile payment services development. Lack of contemporary research is understandable, however, since the legislation, such as the relationship between mobile payments and the e-money directive in EU, is only currently being formulated. Important questions for future research include the role and extent of regulation needed to provide a viable, fair and secure environment for different parties in the m-payment market.

**The competitive factors** in our framework describe the different players and their relative power in influencing the development of mobile payment market. Based on the findings, we outline five broad propositions for research concentrating on the competitive factors.

P5: The factors affecting consumer adoption of mobile payments have been addressed by prior literature (Dahlberg et al., 2003a; Mallat & Dahlberg, 2005; Valcourt et al., 2005). Our review suggests, however, that consumer influence on the development of new mobile payment services contributes to their success and may currently be insufficient. Potential direction to future research is therefore to examine how and to what extent consumers should be included in mobile payments development.

P6: Merchants play a significant role in mobile payment market as both adopters and promoters of the new system. While Merchants' role and adoption determinants have been examined by some of the previous studies (Mallat & Tuunainen, 2005), more research is needed to examine the power and participation of merchants in the mobile payments market.

P7: One of the critical issues for mobile payments success is their position compared with traditional, established payment solutions. At present, mobile payments are competitive for purchases of mobile content and items like vending and ticketing, but the traditional payment services still dominate the volume sales. Future research should study the development trends of different payment services and identify opportunities for mobile payments. One interesting question is whether the value of payment services would be increased by integrating the current chip-based card systems into mobile devices. It is noteworthy that the technology basis as well as the vendors of financial smart-cards (chip-based credit etc. cards) and chip-based mobile telecom SIM cards are the same.

P8: The role and opportunities of mobile payments in contrast with other new e-payment services are not extensively discussed in literature. This is surprising, considering the important facilitating role that payment services have in electronic and mobile commerce. More research is thus needed to determine what types of payment services are needed in the future and how the traditional and new payment services should be integrated to form a seamless overall financial infrastructure for customers.

P9: One factor contributing to the low success of mobile payments is the fragmental market with several small and non-standard solutions. Mobile payment service providers are still looking for their roles and most of them aim for a central position in the value chain. As new payment technologies continue to combine features from both financial and telecom industry, a central aim for future research is to identify the key competencies, natural roles, business models, and strategies that different players could have in the m-payment value chain.

## 8. References

- Antovski, L., & Gusev, M. (2003). M-Payments. Paper presented at the 25th International Conference of Information Technology Interfaces, Cavtat, Croatia



- Bohle, K., & Krueger, M. (2001). Payment Culture Matters - A comparative EU-US perspective on Internet payments (Background Paper No. 4). Electronic Payment Systems Observatory (ePSO).
- Carat, G. (2002). ePayment systems database - trends and analysis. Electronic Payment Systems Observatory (ePSO).
- Chen, J. J., & Adams, C. (2004). Short-range wireless technologies with mobile payment systems. Paper presented at the 6th International Conference on e-commerce, Delft University of Technology, The Netherlands, 25-27 October.
- Chen, J. J., & Adams, C. (2005). User Acceptance of Mobile Payments: A Theoretical Model for Mobile Payments. Paper presented at the 5th International Conference on Electronic Business, Hong Kong, December 5-9.
- Cheong, J. H., Park, M.-C., & Hwang, J. H. (2004). Mobile Payment Adoption In Korea: Switching From Credit Card. Paper presented at the ITS 15th Biennial Conference, Berlin, Germany, September 4-7.
- Chou, Y., Lee, C., & Chung, J. (2004). Understanding m-commerce payment systems through the analytic hierarchy process. *Journal of Business Research*, 57(12), 1423- 1430.
- Dahlberg, T., & Mallat, N. (2002). Mobile Payment Service Development - Managerial Implications of Consumer Value Perceptions. Paper presented at the 10th European Conference on Information Systems, Gdansk, Poland, June 6-8.
- Dahlberg, T., Mallat, N., & Öörni, A. (2003a). Consumer acceptance of mobile payment solutions - ease of use, usefulness and trust. Paper presented at the 2nd International Conference on Mobile Business, Vienna, Austria, June 23-24.
- Dahlberg, T., Mallat, N., & Öörni, A. (2003b). Trust enhanced technology acceptance model - consumer acceptance of mobile payment solutions. Paper presented at the 2nd Mobility Roundtable, Stockholm, Sweden, May 22-23.
- Das, M. L., Saxena, A., & Gulati, V. (2005). MMPS: a versatile mobile-to-mobile payment system. Paper presented at the 4th International Conference on Mobile Business, Sydney, Australia, July 11-13.
- Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use and User Acceptance of Information Technology. *MIS Quarterly*, 13(3 (September)), 319-340.
- Dewan, S. G., & Chen, L.-d. (2005). Mobile Payment Adoption in the USA: A Cross-industry, Cross-platform Solution. *Journal of Information Privacy & Security*, 1(2), 4-28.
- Ding, M. S., & Hampe, J. F. (2003a). Changing Technological and Business Landscapes for mPayment: Is Local Mobile Payment Emerging as the Winner? Paper presented at the 8th International Workshop on Mobile Multimedia Communications, Munich, Germany
- Ding, M. S., & Hampe, J. F. (2003b). Reconsidering the Challenges of mPayments: A Roadmap to Plotting the Potential of the Future mCommerce Market. Paper presented at the 16th Bled eCommerce Conference, Bled, Slovenia, June 9-11.
- Grönroos, C. (1997). Value-driven Relational Marketing: from Products to Resources and Competences. *Journal of Marketing Management*, 13(5), 407-439.
- Huber, A. (2004). Mobile Payment, A Comparison between Europe and the US (Semester Thesis). University of Zurich.
- Javalgi, R., & Ramsey, R. (2001). Strategic issues of e-commerce as an alternative global distribution system. *International Marketing Review*, 18(4), 376-391.
- Jayawardhena, C., & Foley, P. (2000). Changes in the banking sector - the case of Internet banking in the UK. *Internet Research*, 10(1), 19-31.
- Karnouskos, S. (2004). Mobile payment: A journey through existing procedures and standardization initiatives. *IEEE Communications Surveys and Tutorials*, 6(4), 44-66.



- Karnouskos, S., Hondroudaki, A., Vilmos, A., & Csik, B. (2004). Security, Trust and Privacy in the SEcure MObile Payment Service. Paper presented at the 4th International Conference on Mobile Business, Sydney Australia, July 11 - 13.
- Khodawandi, D., Pousttchi, K., & Wiedemann, D. G. (2003). Akzeptanz mobiler Bezahlverfahren in Deutschland. Paper presented at the 3rd Workshop Mobile Commerce, Augsburg, Germany
- Kim, S. K. (2004). Modeling of Policy-based Mobile Payment. Paper presented at the 6th Intl. Conference on Advanced Communication Technology, Phoenix Park, Korea, Feb. 9-11.
- Kungpisdan, S., Srinivasan, B., & Le, P. D. (2004a). Accountability Logic for Mobile Payment Protocols. Paper presented at the International Conference on Information Technology: Coding and Computing, Las Vegas, USA, April 5-7.
- Kungpisdan, S., Srinivasan, B., & Le, P. D. (2004b). An Integrated Framework for Payment Transactions in Wireless Environments. Paper presented at the International Conference on Information and Communication Technologies, Bangkok, Thailand
- Lawrence, E., & Lawrence, J. (2004). Legal remedies for Securing the Mobile Enterprise. Paper presented at the IADIS International Conference E-Commerce, Lisbon, Portugal, December 14-16.
- Lawrence, E., Zmijewska, A., & Pradhan, S. (2005). Mobile Payments: Partner or Perish? Paper presented at the 3rd International Conference on Innovative Applications for the Developing World, Kathmandu, Nepal, December 10-12.
- Lee, C.-P., Warkentin, M., & Choi, H. (2004). The role of technological and social factors on the adoption of mobile payment technologies. Paper presented at the 10th Americas Conference on Information Systems, New York, USA, August 6-8.
- Lee, O. (2004). Sound-Based Mobile Payment System. Paper presented at the 2nd International Conference on Web Services, San Diego, USA, July 6-9.
- Lim, A. S. (2005). Pre-Standardisation of Mobile Payments: Negotiations within Consortia. Paper presented at the 4th International Conference on Mobile Business, Sydney, Australia, July 11-13.
- Mahmood, M. A., Bagchi, K., & Ford, T. C. (2004). On-line Shopping Behavior: Cross-Country Empirical Research. *International Journal of Electronic Commerce*, 9(1), 9-30.
- Mallat, N. (2004). Theoretical constructs of mobile payment adoption. Paper presented at the 27th Information Systems Research Seminar in Scandinavia (IRIS), Falkenberg, Sweden, August 14-17.
- Mallat, N., & Dahlberg, T. (2005). Consumer and Merchant Adoption of Mobile Payment Solutions. In T. Saarinen, M. Tinnilä & A. Tseng (Eds.), *Managing Business In A Multi-Channel World: Success Factors For E-Business*. Hershey, PA 17033, USA: Idea Group Publishing.
- Mallat, N., Rossi, M., Tuunainen, V. K., & Öörni, A. (2006). The Impact of Use Situation and Mobility on the Acceptance of Mobile Ticketing Services. Paper presented at the 39th Hawaii International Conference on System Sciences, Hawaii, USA, January 4-7.
- Mallat, N., & Tuunainen, V. K. (2005). Merchant adoption of mobile payment systems. Paper presented at the 4th International Conference on Mobile Business, Sydney, Australia, July 11-13.
- Me, G. (2003). Payment security in mobile environment. Paper presented at the ACS/IEEE International Conference on Computer Systems and Applications, Tunis, Tunisia, July 14-18.
- Ondrus, J., & Pigneur, Y. (2004). Coupling Mobile Payments and CRM in the Retail Industry. Paper presented at the IADIS International Conference e-Commerce, Lisbon, Portugal, Dec. 14-16.

- Ondrus, J., & Pigneur, Y. (2005). A Disruption Analysis in the Mobile Payment Market. Paper presented at the 38th Hawaii International Conference on System Sciences, Hawaii, USA, January 3-6.
- Ondrus, J., & Pigneur, Y. (2006a). A multi-stakeholder multi-criteria assessment framework of mobile payments: An illustration with the Swiss public transportation industry. Paper presented at the 39th Hawaii International Conference on System Sciences, Hawaii, USA, January 4-7.
- Ondrus, J., & Pigneur, Y. (2006b). A Systematic Approach to Explain the Delayed Deployment of Mobile Payments in Switzerland. Paper presented at the 5th International Conference on Mobile Business, Copenhagen, Denmark, June 26-27.
- Ondrus, J., & Pigneur, Y. (2006c). Towards a holistic analysis of mobile payments: A multiple perspectives approach. *Electronic Commerce Research and Applications*, in press.
- Plouffe, C. R., Hulland, J. S., & Vandenbosch, M. (2001). Research report: Richness versus parsimony in modeling technology adoption decisions-understanding merchant adoption of a smart card-based payment system. *Information Systems Research*, 12(2), 208-222.
- Porter, M. (1998). *Competitive Strategy*. New York: Free Press.
- Pousttchi, K. (2003). Conditions for Acceptance and Usage of Mobile Payment Procedure. Paper presented at the 2nd International Conference on Mobile Business, Vienna, Austria, June 23-24.
- Pradhan, S., Lawrence, E., & Zmijewska, A. (2005). Bluetooth as an Enabling Technology in Mobile Transactions. Paper presented at the International Conference on Information Technology: Coding and Computing, Las Vegas, USA, April 5-7.
- Schwidderki-Grosche, S., & Knospe, H. (2002). Secure Mobile Commerce. *IEE Electronics and Communication Engineering Journal*, 14(5), 228-238.
- Shapiro, C., & Varian, H. R. (1999). *Information Rules. A Strategic Guide to the Network Economy*. Boston, MA: Harvard Business School Press.
- Sundqvist, S., Frank, L., & Puumalainen, K. (2002). The effects of country characteristics, cultural similarity and adoption timing on the diffusion of wireless communications. *Journal of Business Research*, 58(1), 107-110.
- Teo, E., Fraunholz, B., & Unnithan, C. (2005). Inhibitors and facilitators for mobile payment adoption in Australia: A preliminary study. Paper presented at the 4th International Conference on Mobile Business, Sydney, Australia, July 11-13.
- Valcourt, E., Robert, J.-M., & Beaulieu, F. (2005). Investigating mobile payment: supporting technologies, methods, and use. Paper presented at the International Conference on Wireless and Mobile Computing, Networking and Communications, Montreal, Canada, August 22-24.
- Weber, R. (1999). Chablis - Market Analysis of Digital Payment Systems. Technical Report TUM-I9819. Technical University of Munich.
- Yu, H.-C., Hsi, K.-H., & Kuo, P.-J. (2002). Electronic payment systems: an analysis and comparison of types. *Technology in Society*, 24(3), 331-347.
- Zheng, X., & Chen, D. (2003). Study of Mobile Payments System. Paper presented at the IEEE International Conference on E-Commerce, June 24-27.
- Zmijewska, A. (2005). Evaluating Wireless Technologies in Mobile Payments – A Customer Centric Approach. Paper presented at the 4th International Conference on Mobile Business, Sydney, Australia, July 11-13.
- Zmijewska, A., & Lawrence, E. (2005). Reshaping the Framework for Analysing Success of Mobile Payment Solutions. Paper presented at the IADIS International Conference on E-Commerce, Porto, Portugal

- Zmijewska, A., & Lawrence, E. (2006). Implementation Models in Mobile Payments. Paper presented at the IASTED International Conference on Advances in Computer Science and Technology (ACST), Puerto Vallarta, Mexico
- Zmijewska, A., Lawrence, E., & Steele, R. (2004a). Classifying M-payments - a User-Centric Model. Paper presented at the 3rd International Conference on Mobile Business, New York, USA, July 12-13.
- Zmijewska, A., Lawrence, E., & Steele, R. (2004b). Towards understanding of factors influencing user acceptance of mobile payment systems. Paper presented at the IADIS International Conference WWW/Internet, Madrid, Spain, October 6-9.