

# Exploring consumer adoption of mobile payments – A qualitative study

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## Abstract

This paper presents a qualitative study on consumer adoption of mobile payments. The findings suggest that the relative advantage of mobile payments is different from that specified in adoption theories and include independence of time and place, availability, possibilities for remote payments, and queue avoidance. Furthermore, the adoption of mobile payments was found to be dynamic, depending on certain situational factors such as a lack of other payment methods or urgency. Several other barriers to adoption were also identified, including premium pricing, complexity, a lack of critical mass, and perceived risks. The findings provide foundation for an enhanced theory on mobile payment adoption and for the practical development of mobile payment services.

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## 1. Introduction

The emergence of new retail channels such as the Internet and mobile commerce create requirements for new payment instruments to enable feasible and convenient transactions in these channels (Ondrus and Pigneur, 2006). While existing card payments are suitable for most purchases, their transaction costs are too high to be profitable in micropayment transactions (Mallat et al., 2004).

Mobile payments have been suggested as a solution to facilitate micropayments in electronic and mobile commerce, and to provide an alternative for the diminishing use of cash

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at point of sale (POS) (Menke and de Lussanet, 2006; Ondrus and Pigneur, 2006). Mobile phones have several characteristics which make them useful for payment purposes. First, the proliferation of mobile telecommunications technology has made mobile phones increasingly common and available for users. Second, compared to fixed-line computers and telephones, mobile phones are closer to the user, which enables the storing of personal information in them and facilitates their use as a payment instrument. Third, existing telecom operator billing systems are already suitable for handling micropayment transactions. Finally, the success of early mobile content services such as logos and ring tones suggest that consumers are already accustomed to using their mobile devices for payment purposes.

At present, there are many examples of successful mobile payment applications such as the mobile content market which has developed into a billion dollar business, (Menke and de Lussanet, 2006), PayPal Mobile (Wolfe, 2007) or use of mobile payments in public transportation (Mallat et al., 2004). Wider adoption of mobile payments, however, has not been as rapid or widespread as expected (Ondrus and Pigneur, 2007) and there is a long list of discontinued mobile payment services such as the Simpay initiative and the Paybox launched in several European countries.

The success or failure of mobile payments has strategic implications for many companies. Companies may gain competitive advantage through offering mobile payments to their customers or becoming a mobile payment service provider themselves. When considering the future of electronic and mobile commerce, the ability to develop suitable payment systems for these environments is of critical importance. The new mobile channel with integrated mobile payment systems could significantly facilitate the development of new business models in the emerging multi-channel and multi-device environment. At POS, new payment instruments have the potential to both increase the convenience of payments and lower the transactions costs. Yet, the use of mobile payments by different companies is significantly hampered by the uncertainty of their advantages and the success of the new technology.

A recent survey suggests that companies in the mobile payment business perceive consumer acceptance as the greatest barrier to mobile payment adoption (Edgar Dunn and Company, 2007). Consumer adoption behaviour is therefore one of the key issues and we need to ask why new mobile payments will or will not be used by their intended users. Prior studies suggest that consumers are generally interested in using mobile payment applications (Dewan and Chen, 2005; Kreyer et al., 2003) but more research is needed to examine the specific factors that influence consumer decisions to adopt mobile payments.

The objective of this study is to explore consumer adoption of mobile payments by empirically detecting the adoption determinants that are relevant for the new mobile payment context. The paper contributes to existing mobile commerce and technology adoption research. It does so by presenting a detailed description of the traditional adoption factors that are postulated to enhance and inhibit mobile payment adoption and presenting new factors that are postulated to augment the contemporary adoption theories in the context of mobile payments. It also provides the foundation for future research by extending the findings of the present study to more general research questions that guide future research on the adoption of mobile services and technologies. The findings also facilitate strategic organizational decision-making by providing insights into areas where consumers see mobile payments as most applicable and by providing guidance for the developers and providers of these new payment systems.

## 2. Mobile payments

Mobile payments are defined as the use of a mobile device to conduct a payment transaction in which money or funds are transferred from payer to receiver via an intermediary, or directly, without an intermediary. This paper focuses on examining consumer willingness to use a mobile phone as a payment instrument in retail transactions where money is transferred from a consumer to a merchant in exchange for products or services. The payment instrument is determined as a tool for the payer to initiate the transfer of the means of payment, which again refer to a monetary claim that is accepted by the beneficiary (ECB, 2003, p. 61).

The most common way to conduct mobile payments in Europe is to call or send an SMS to a premium rate service number (Menke and de Lussanet, 2006). Payments for goods and services are then charged to the customer's mobile phone bill or deducted from prepaid airtime of prepay subscribers. Smart phones enable mobile payments via the phone's mobile Internet connection instead of typing an SMS. Mobile phones can also be used as an access channel or platform to existing payment means, such as bank accounts, debit cards, and credit cards. Yet another alternative is to open a separate account to which money is transferred and mobile payments are debited. A new generation of mobile payment solutions for proximity payments, such as i-mode FeliCa in Japan, utilize contactless RFID (Radio Frequency Identification) chips embedded in mobile phones that have a different payment procedure compared with SMS-enabled payments (Taga and Karlsson, 2005). Current and potential mobile payment applications include, for example, vending, ticketing, purchase of mobile content services, peer to peer fund transfers, payments on the Internet, and payments of goods and services in shops, restaurants and corner stores (Kreyer et al., 2003; Taga and Karlsson, 2005).

## 3. Adoption of mobile and electronic payment systems

The theoretical background of this study is drawn from the diffusion of innovations theory (Rogers, 1995) that is augmented with constructs of network externalities (Economides, 1996; Van Hove, 1999), trust and security (Gefen et al., 2003; Jarvenpaa et al., 2000) and situational factors (I. Lee et al., 2005). This chapter further discusses the theory of consumer life cycle to provide background for the focus group design in the methodology section.

Diffusion of innovations is a multidisciplinary theory frequently applied in IS adoption research. Empirical research has supported the applicability of the diffusion theory in predicting the adoption of various information systems such as spreadsheets (Brancheau and Wetherbe, 1990), WWW (Agarwal and Prasad, 1997) and operating systems (Karahanna et al., 1999). The diffusion of innovations theory has also been widely used to explain the adoption of a variety of financial and mobile technologies including smart cards (Plouffe et al., 2001; Szmigin and Bourne, 1999), mobile commerce (Teo and Pok, 2003), and mobile banking (M. S. Y. Lee et al., 2003). Compared with the technology adoption model TAM (Davis, 1989; Davis et al., 1989) that was developed to predict end-user acceptance of information systems within organizations, the original diffusion of innovations theory was deemed more suitable for this study because the subjects are consumers, not organizational users.

The diffusion of innovations theory determines five innovation characteristics that affect adoption: relative advantage, complexity, compatibility, trialability, and observability

(Rogers, 1995, p. 212–251). Of these constructs, relative advantage, complexity, and compatibility have provided the most consistent explanation for the adoption of information systems (Tornatzky and Klein, 1982) and mobile adoption research (Teo and Pok, 2003; Wu and Wang, 2005) and are therefore applied in this study.

### *3.1. Relative advantage of mobile payment systems*

In traditional IS research, where adoption is studied in the organizational context, the relative advantage factor has consisted of performance measures such as performance increase, effectiveness, and time savings (Davis, 1989; Moore and Benbasat, 1991). In the mobile commerce and payment context, previous studies suggest that one of the key attributes impacting the relative advantage of mobile technologies and services is their independence of time and location (Carlsson et al., 2006; Constantiou et al., 2006; Jarvenpaa and Lang, 2005). Mobile payments provide consumers with ubiquitous payment possibilities, timely access to financial assets and an alternative to cash payments. The users can, for example, pay for transportation tickets or car parking remotely without the need to visit an ATM, a ticketing machine or a parking metre (Mallat et al., 2004). The relative advantage of mobile payments compared with traditional payment instruments is thus likely to include time and location independent payment possibilities.

### *3.2. Compatibility*

Compatibility captures the consistency between an innovation and the values, experiences, and needs of potential adopters (Rogers, 1995). In IS adoption research, the compatibility of the technology has commonly been assessed in relation to the potential adopter's work and tasks (Moore and Benbasat, 1991; Taylor and Todd, 1995). Regarding payment systems, the consumers' ability to integrate them into their daily life is an important aspect of compatibility (Lee et al., 2003). Compatibility has been found as a significant determinant of mobile technology and service adoption (Teo and Pok, 2003; Wu and Wang, 2005). The compatibility of mobile payments with consumers' purchase transactions and habits is correspondingly expected to impact the adoption.

### *3.3. Complexity*

In the diffusion of innovations theory, complexity is determined as the “degree to which an innovation is perceived as difficult to understand and use” (Rogers, 1995, p. 16). Complexity and problems with usability have contributed to the low adoption of a variety of payment systems, including smart cards and mobile banking (Laukkanen and Lauronen, 2005; Szmigin and Bourne, 1999). Similarly, ease of use and convenience have been found to affect consumer adoption of mobile technologies and services (Jarvenpaa et al., 2003; Nysveen et al., 2005; Teo and Pok, 2003). Mobile payments are commonly expected to increase consumer convenience by reducing the need for coins and cash in small transactions and increasing the availability of payment possibilities (Mallat et al., 2004). Limitations in mobile device features, however, diminish the usability of mobile technologies (Siau et al., 2004). Typical limitations include small keypads, limited transmission speeds and memory, and short battery life.

### 3.4. *Costs*

In traditional adoption research, the cost is incorporated in the relative advantage construct (Rogers, 1995). In this study, cost is treated as a separate factor to clearly differentiate it from the relative advantage of time and place independence. Kim et al. (2007) found that the perceived fee has a significant effect on the perceived value of mobile Internet. Perceived service cost has also been found as a significant determinant for the intention to use wireless financial services (Kleijnen et al., 2004), mobile banking (Luarn and Lin, 2005), and mobile commerce transactions (Wu and Wang, 2005). In the mobile payment context, the transaction costs of mobile payments are often included in the price of the purchased item. For example, a soft drink at a vending machine costs more if it is paid for with a mobile payment than if it is paid for with cash. Cost is therefore likely to have a significant impact on mobile payment adoption.

### 3.5. *Network externalities and critical mass*

Network externalities are considered as a relevant factor in mobile payment adoption because payment technologies exhibit indirect network externalities (Economides, 1996; Van Hove, 1999). Failure to create critical mass has impacted the continuance of several previous payment systems (Szmigin and Bourne, 1999; Van Hove, 2001). Mobile payments represent a new payment network in the market. A consumer's decision to adopt the network is significantly affected by the amount of merchants using it, since that amount determines the opportunities for consumers to use the new payment service. New consumers adopting the network indirectly increase the value of the network for all consumers because they attract new merchants to join the network. Consumer adoption of mobile payments is therefore likely to depend on the perceived amount of adopting merchants and other consumers.

### 3.6. *Security and trust in mobile payment systems*

The importance of trust is highlighted in electronic and mobile commerce because of the spatial and temporal separation between buyer and seller when buyers are required to give delicate personal information such as telephone number or credit card number to the seller (Grabner-Kräuter and Kaluscha, 2003). Previous studies have found trust as a significant determinant influencing customers' willingness to conduct electronic commerce transactions (Gefen et al., 2003; Jarvenpaa et al., 2000). Similarly, previous research proposes that perceived security and trust in vendors and payment systems is a significant determinant of mobile commerce success (Siau et al., 2004; Xu and Gutiérrez, 2006), and that trust has a positive impact on customer loyalty and satisfaction towards mobile commerce (Lin and Wang, 2006). Consumers' concerns about the privacy and security of mobile payments are commonly related to authentication and confidentiality issues as well as to concerns about secondary use and unauthorized access to payments and user data (Dewan and Chen, 2005). Perceived security and trust are thus expected to impact the adoption of mobile payments.

### 3.7. *Use situation*

Two different streams of research, consumer behaviour and human computer interaction (HCI), have examined the impact of the use situation on preferences for products, ser-

vices, and technology use. Dey et al. (2001) define context as “any information that characterizes a situation related to the interaction between humans, applications, and the surrounding environment”. Belk (1975) postulates a categorization of five different situational factors: physical context, social context, temporal context, the task at hand and the role in which it is performed; and the antecedent states of action defined by momentary moods or conditions such as availability of change. Prior research has found that situational factors affect consumer choice and the selection criteria of payment systems (Hirschman, 1982; Perry et al., 2001). Perry et al. (2001) note that ubiquitous mobile access is dependent on the technological and social contexts of the use environment. Lee et al. (2005) studied the use of mobile Internet in Korea and found that a few key contextual factors impacted the use of different mobile Internet services. Previous studies further suggest that the use situation has a significant impact on the consumer choice of purchase channels and perception of the channel attributes that determine the choice (Gehrt and Yan, 2004). Since consumers can use mobile payments in a variety of locations and situations, it can be expected that situational factors impact their adoption.

While the above discussion has considered the characteristics of innovation, another significant group of factors determining adoption are the characteristics of individual adopters. Within consumer research, a consumer life cycle theory (Wells and Gubar, 1966) has been proposed as a powerful predictor of purchase decisions. The theory postulates that consumers have a series of predictable stages in their lives that are associated with systematic patterns of expenditures (Wilkes, 1995). The stages include, for example, whether people are single or married, whether they have children at home, whether they are in work life or retired. Wilkes (1995) studied changes in household spending across a variety of products and found that expenditures across many products were clearly dependent on the stage of a consumer’s life cycle. In IS research, Brown and Venkatesh (2005) applied the household life cycle theory to examine PC adoption in US households and found that the life cycle stage had a significant impact on the attitudinal beliefs toward adoption. Previous findings indicate that the stage of consumer life cycle can be meaningfully related to systematic spending behaviour. It is thus also possible to see a variation in the adoption of mobile payments depending on the consumers’ life cycle phase.

This chapter has reviewed previous literature in different fields of IS, mobile and electronic commerce research, and postulated seven innovation characteristics as the most influential determinants for the adoption of mobile payments; relative advantage, complexity, compatibility, network externalities, trust, cost, and use situation. The following chapters aim to contribute to the existing diffusion theory by offering a rich description and detailed understanding of these factors in the mobile payment context, augmenting the existing adoption theories with new situational factors, and postulating measures and research questions that facilitate the future research of mobile payments and commerce.

#### **4. Methodology and data collection**

As mobile payments are a relatively new area for research, a qualitative approach using focus group interviews was chosen to explore consumer adoption of mobile payments. Focus group interviews have been suggested as a suitable method for explorative studies (Calder, 1977) and previous research has demonstrated their feasibility in studying innovative mobile services (Jarvenpaa and Lang, 2005).



The strength of focus group interviews lies in group dynamics and interaction, which provide researchers with elaborated perspectives to the topic under discussion (Wilkinson, 2004). Compared with individual interviews, the group members are more likely to challenge each other's views, argue for or change their own views, and bring forward issues that are important to them (Bryman and Bell, 2003, p. 369). Focus groups thus reflect the process through which meaning is constructed in everyday life (Bryman and Bell, 2003, p. 370) and were therefore deemed as especially informative for the purposes of theory development in a new research area.

For the interaction to succeed and group dynamics to work, the selection of groups is especially important. Stewart and Shamdasani (1990, p. 33) note that "the usefulness and validity of focus group data are affected by the extent to which participants feel comfortable about openly communicating their ideas, views or opinions". Naturally forming groups are particularly found to be relaxed and at ease in conversations (Bryman, 2004).

To ensure proper discussion and interaction during the sessions, six naturally forming groups were selected for the current study. The members knew each other as friends, classmates, co-workers, or through a common hobby. We attempted to form a number of cohesive groups which loosely cover the phases of the Wells and Gubar's (1966) original theory on consumer life cycle. The following groups were interviewed: teenagers (14–15 years of age), university students, young adults who had already entered working life, parents of small children, and middle-aged persons. The discussions followed a semi-structured guide, which was tested with a pilot group of young adults I. As no major modifications to the guide were necessary and the group was consistent with research design, the data was included in the study. The group sizes varied between 6 and 9 subjects and the total number of subjects was 46, which follows the common recommendations for focus group composition (Wilkinson, 2004). A further selection criterion for participants was previous experience in the use of mobile phones. Experience in mobile phone use was estimated to be necessary in order for the participants to be able to discuss the use of mobile payments. Table 1 describes the participants in different focus group sessions.

The interviews lasted between one and two hours. A €14 gift certificate was offered for each participant as an incentive. The interviews were conducted in the Helsinki metropolitan area in Finland in late 2002. The general financial and telecommunication infrastructure in the country is favourable towards diffusion of new mobile payment services, as mobile phone penetration in Finland is high (87% in 2002 and over 100% in 2006; [www.statfin.fi](http://www.statfin.fi)), and as most of the payment transactions are conducted electronically (92% in 2002 and 96% in 2006; [www.fkl.fi](http://www.fkl.fi)). The timing of the data collection was suitable for the adoption study because mobile payments were available in the market but were still

Table 1  
Focus group description

Group (N)	Description
Teens (8)	Teenagers and classmates, 14–15 years of age
Students (7)	Students and members of a student association in the University of Helsinki, most in their early twenties
Young adults I (8)	Adults who have entered working life, most in their twenties
Young adults II (8)	Adults who have entered working life, in their twenties
Parents (6)	Parents of small children and work colleagues, most between 30 and 39 years old
Middle-aged (9)	Members of a hobby group, most between 50 and 59 years old

a relatively new innovation. We were therefore able to study mobile payments at a time when their adoption decision was still recent for the interviewees and to avoid the recall problem of adoption studies (Rogers, 1995). The Helsinki metropolitan area was deemed appropriate for the exploratory research as consumers are able to pay for a variety of purchases with mobile phones there including vending, public transportation, and parking.

Four researchers conducted the interviews in pairs where one moderated the discussion and the other managed a recorder and the facilities. The discussions were held either at the Helsinki School of Economics' facilities or at a common place of assembly for the interviewed group, depending on which arrangement was preferred by the participants. The interviews were recorded and transcribed and the transcriptions were coded with Atlas.ti 4.2 software. The coded segments included specific words, themes or issues, which commonly occurred within and across the discussion groups. The coding followed the qualitative clustering method in which text that have similar patterns or characteristics are grouped and then conceptualized (Miles and Huberman, 1994). The initial list of codes, with which the excerpts were grouped and conceptualized, included the adoption factors discussed in the theory section. Additional codes and concepts were, however, allowed if they should emerge in the analysis. When the initial coding was completed, the list of excerpts under each factor was repeatedly reread in order to check that the excerpts were coherently applied and the factors consistently composed. During these check-ups, some revisions to the coding were made. For example, some excerpts were placed under a different code. The object of the analysis was to identify determinants for mobile payments adoption. As mobile payment markets were currently at an early development stage, discussions on the adoption of mobile payments concerned their future adoption intention.

## 5. Results

### 5.1. Mobile phone and mobile service use

The group members had an average of 4 to 7 years experience in mobile phone use. The phones were mostly used for communication either by calling or sending an SMS. Premium SMS services and WAP services were used more infrequently.

Each interviewed group included persons who had made purchases with a mobile phone. Altogether, 39 out of the total 46 interviewees had some experience in using mobile payments. Typical purchases paid for with a mobile phone included mobile phone content such as ring tones and logos, purchases from vending machines such as soft drinks and sweets, car parking tickets, and public transportation tickets. Mobile payments were not used regularly, however, but more on a trial basis and the groups commonly discussed mobile payment adoption using the future tense. A summary of group characteristics, which were queried with a one-page form in the beginning of each interview, is reported in Table 2.

### 5.2. Consumer life cycle stages in mobile payments adoption

The similarity of use of mobile phones and services between the interviewed groups was greater than expected. The perceived benefits and barriers to use mobile payments were similar in all groups, and all groups listed similar preferred application areas for mobile payments. A few differences between groups were detected. The teenage group was distin-



Table 2  
Mobile phone and service use experience between the groups

Group (N)	Mobile phone use, in years	SMS sent per day	Use frequency of premium SMS services	Use frequency of WAP services	Persons who have used M-payments
Teens (8)	5	7	Monthly	Less than monthly	8
Students (7)	5	3	Less than monthly	Less than monthly	7
Young adults I (8)	7	3	Less than monthly	Less than monthly	8
Young adults II (8)	7	4	Less than monthly	Less than monthly	7
Parents (6)	6	2	Monthly	Less than monthly	5
Middle-aged (9)	4	2	Less than monthly	Never	4

guished by their financial dependence on their parents who in the end made the decisions on the teens' use of money and payment instruments. The middle aged group had the least experience of mobile payments use; five of the seven non-adopters were in this group (see Table 2), and the group listed fewer benefits of mobile payments than other groups. They did, however, perceive several mobile payment applications as useful and their perceptions corresponded with the views of other groups. The following sections discuss the mobile payment characteristics, which emerged as determining factors for mobile payments adoption.

### 5.3. Relative advantage

The relative advantage of mobile payments mentioned by interviewees included the possibility to make payments ubiquitously, independence of time and place, and the possibility to avoid queues. Interviewees perceived independence of location as useful because payments could be conducted remotely without having to move to a point of sale. Remote payment was perceived as especially convenient for items that could be digitized and sent directly to a person's phone, such as movie tickets. Furthermore, interviewees commonly visualized points of sale as crowded and expected to avoid queuing by paying remotely with a mobile phone.

*"I think that the biggest advantage of a mobile phone is that if the payment is in a difficult place either because of queues or distance-wise, you don't have to go to the point of sale just for that purpose." (Parents)*

*"Take a cinema ticket, for example. You leave home, sit on a tram and already have the ticket in the form of an SMS and then you just walk past the box office directly to the theatre and show them that you have the ticket." (Young adults I)*

Mobile payments were also considered advantageous because people carry mobile phones with them most of the time and the phone is therefore conveniently available in most situations. Many interviewees stated that they often did not have enough cash or small coins with them and described that lack of exact change could potentially cause problems, for example, with vending machines, public transportation, and small payments in shops and kiosks. Compared to cash, the benefits of mobile payments are that the payment method is more often available, the person paying always has the exact change and that there is no need to find an ATM to withdraw cash.

*“If you are downtown and would like to go to the movies with your friends but you don’t have any money you could pay with your mobile phone.” (Teenagers)*

*“At the time when you are getting a passport photo and you need a certain amount of specific coins. Or with a locker or a parking metre where you need a certain type of coins. You usually don’t have them and then you need to exchange them or buy something small to get them.” (Students)*

Some interviewees noted that in addition to complementing the use of cash, some plastic cards could be integrated into mobile devices to reduce the current multitude of cards carried in a wallet, provided that the security of mobile payments would attain a level good enough to prevent fraud and misuse.

#### 5.4. Compatibility

The compatibility of mobile payments was evaluated in terms of how compatible mobile payments are with different types of purchases. The findings suggest that mobile payments are most compatible with small value payments contemplating cash payments.

*“Train tickets could be [suitable for mobile payments], travel tickets.” (Middle-aged)*

*“At the moment it would feel sensible to purchase just these items, tram tickets and parking, things that you can pay for with a mobile phone at that moment.” (Young adults II)*

Based on the group discussions, the following four categories were identified as particularly suitable for mobile payments: (1) electronic ticketing such as movies, public transportation, car parking, and concerts, (2) mobile content and services such as games, music, pictures, news, directory enquiries, and public transport route information, (3) purchases on vending machines and various other forms of self-service machines such as lockers, photo booths, hair dryers in locker rooms, and self-service petrol stations, and (4) small value payments at a POS such as a chocolate bar or a newspaper at a kiosk, or a bottle of milk in a corner shop on the way home.

Compatibility of mobile payments with larger value purchases was perceived as poor and some interviewees found that mobile payments provide no additional value at POS. Reservations concerning larger value purchases were mostly caused by a perceived lack of suitable charging models, security, need, and payment documentation. In general the interviewees concluded that the possibility of paying for high value items with a mobile phone was a long-term development and not likely to diffuse in the near future. Currently, the interviewees were ready to pay for purchases up to 10–100€ with mobile phones.

#### 5.5. Complexity

The complexity of mobile payment services frequently emerged as a barrier to adoption in the discussions. Among the most complex issues in current mobile payment methods was the use of SMS, which received a heavy critique from the interviewees. Interviewees explained that the message formats are often complicated and slow to key in, various pay-

ment codes and premium service numbers are difficult to remember, and instructions for making payments are difficult to find. The critique indicates that mobile payment procedures need to be simpler and faster, including just a few keystrokes and possibly another technology to replace SMS.

In addition to SMS, complex registration procedures and separate billing arrangements also caused additional complexity in the use of mobile payments. In particular, the interviewees considered separate accounts for mobile payments as a burden because they require money transfers to and from the mobile account and because it is difficult to follow up the mobile account's balance. The interviewees also noted that decentralizing one's money to many different accounts was complex and difficult to manage.

*"It [purchasing a mobile tram ticket] was a bit difficult. I only found instructions on how to do it in one place. And then when you need it you don't know how you can order it." (Teenagers)*

*"Well, for example, I haven't signed up for the [mobile] parking service because I would have to register somewhere and I haven't bothered to find out where I should register and what it would require from me ... they have not made it easy for me." (Parents)*

#### 5.6. Network externalities

The interviewees stated that a lack of large merchant acceptance inhibits adoption of mobile payments. At present, there are not enough opportunities for consumers to use and become familiar with mobile payments. Furthermore, the potential for mobile payments to complement cash payments is small if mobile payments are not commonly accepted. Some of the interviewees required that mobile payments become as common as conventional payment methods. Others would be satisfied with a frequent acceptance within selected product categories.

*"It would probably be easier to use if it were familiar. Now it is used here and there. ... but it is just that it is in hardly any places and you always ask yourself how it works." (Young adults I)*

The interviewees further noted that mobile payments should not be exclusive to the customers of certain financial and telecommunication service providers but widely available for all customers of different banks and mobile operators. Similarly, the interviewees were reluctant to change their mobile phone model or manufacturer just to gain the payment functionality.

#### 5.7. Costs

Some of the interviewees said that they had refrained from using mobile payments because of premium pricing. If there is a cash payment alternative for mobile payments in vending machines, for example, the item paid for with a mobile phone costs commonly more than the same item paid for with cash. The interviewees were very critical of premium pricing and it clearly discouraged them from using mobile payments.

*"I noticed that I could pay for purchases on a vending machine with a mobile phone, but it was more expensive than using coins and I thought it was totally unnecessary and I used coins." (Young adults I)*

*"I think it is a precondition in new things like this that it doesn't cost more. I won't pay for paying with it. I think it kills good ideas from the start because nobody is ready to pay for it as long as debit cards and other systems work as well as they do." (Students)*

#### 5.8. Perceived risks and trust in mobile payment service providers

Perceived risks of mobile payments described by the interviewees related to six different categories, which are discussed in more detail below.

Unauthorized use of the mobile phone was perceived as a risk by the interviewees who were concerned that someone would be able to pay with their mobile phone if the device was lost, stolen or hacked, for example.

*"These code detections. Someone listens to your phone and gains control of it from the frequency so that he hears which keys you push in different phases and picks up your code and starts to charge and you get the bill after a month and its all in the red." (Young adults II)*

Lack of transaction record and documentation was considered as risky by the interviewees as it made follow-up on past payments more difficult. The interviewees suspected that without proper documentation they could easily end up spending more money than they intended. Furthermore, without a receipt, a payer has no proof of the payment transaction, therefore making any claims for a refund difficult.

Errors in payment transactions were perceived as another potential risk by the interviewees. The errors could be caused by the payment system or by their own mistakes in the use of the system. A common concern was whether the right amount would be credited and sent to the right account when paying with a mobile device.

*"...and if you pay for say, a bus ticket and then the code is such that it pays for something else which costs a hundred euros more or something, how can you make sure that you pay for the right service totalling the right amount at the time you make the payment?." (Middle-aged)*

Vagueness of the transaction and perceived lack of control was mentioned by many interviewees when they described their experiences with mobile payments. The interviewees were unsure whether the payment had taken place or not and whether or not the payment had been charged. One interviewee described a situation where delays in the process had led to the interviewee repeating the purchase order operation, with a result that the product was purchased twice:

*"I have had problems a few times because the return message comes very slowly and I have thought that OK my message did not get through and I have made the purchase again and then I could not cancel the first purchase." (Young adults I)*

Device and mobile network reliability was a common concern among the interviewees who were worried that the phone's battery could run out or the network connection could fail in the middle of a payment transaction.

Compromising privacy was perceived as a risk by some of the interviewees who therefore were unwilling to disclose their information to payment service providers. They were concerned that their payments would be tracked, personal information misused or that they would begin to receive a lot of advertisements if they registered themselves to a new payment system.

*“...similar to payment cards, the mobile phone will leave traces about where and what you have purchased.. And I already have the feeling that Big Brother is watching.”  
(Students)*

The findings further indicate that trust in mobile payment service providers and merchants reduced the perceived risks of mobile payments. The interviewees were more willing to conduct payments with trustworthy transaction parties and regarded established banks, credit card companies, and telecom operators as reliable mobile payment service providers. Banks were slightly preferred to other providers. The results suggest that reliable and well-established payment service providers are better appreciated than unknown and smaller competitors in the same market.

*“One thing which makes mobile payments safe for me is the collaborating partner. If there is some nonsense company I certainly won’t use it. But if there is my operator and my bank they have credibility as companies, so that it is enough to convince me that they won’t mess up. But it requires a name behind it to guarantee that it works.” (Young adults II)*

### 5.9. Impact of use situations

The impact of use situation on mobile payments use was clearly demonstrated in the interviews. It was frequently highlighted in the interviewee comments that the advantage of mobile payments is dependent on situational factors such as presence of queues, lack of alternative payment methods, hurry, and unanticipated need. Interviewees perceived mobile payments as most advantageous in these situations and considered them as a back-up for existing payment methods.

*“If you have left your travel card at home and have jumped into a tram and just then remember that ‘oh no’ then with a mobile phone you can still fix the situation.” (Young adults I)*

Situational factors did not have a corresponding impact on other adoption determinants as they had on relative advantage. This is understandable, as it is the relative advantage that reflects the ubiquitous features of mobile payment services that enable reactions to unexpected situational conditions.

## 6. Discussion

The purpose of this paper was to examine factors that affect consumer adoption of mobile payments. As the study is explorative in nature, we use the findings to guide theory development by offering a detailed description of the postulated adoption factors. Furthermore, we raise research questions to generate new research directions based on the explorative findings.

The findings are summarized in Table 3, which lists the general adoption determinants and related contributing items that are specific to the mobile payment environment. The

Table 3

Factors affecting consumer adoption of mobile payments

Adoption factor	Contributing items	Proposed effect on adoption	Effect dynamic depending on use situation
Relative advantage	■ Time and place independent payments	+	Yes
	■ Queue avoidance	+	
	■ Enhanced payment instrument availability	+	
	■ Complement to cash	+	
Compatibility	■ High with digital content and services	+	No
	■ High with small value purchases at POS	+	
	■ Low with large value purchases	–	
Complexity	■ Complex data input formats, codes, service numbers	–	No
	■ Management of separate accounts burdensome	–	
	■ Complex registration procedures	–	
Costs	■ Premium pricing & high transaction costs	–	No
Network ext.	■ Lack of wide merchant adoption	–	No
	■ Proprietary devices/services	–	
Trust	■ In merchants	+	No
	■ In telecom operators	+	
	■ In financial institutions	+	
Perceived security risks	■ Unauthorized use	–	No
	■ Transaction errors	–	
	■ Lack of transaction record and documentation	–	
	■ Vague transactions	–	
	■ Concerns on device and network reliability	–	
	■ Concerns on privacy	–	

final two columns indicate whether the items have a positive or a negative effect on adoption and whether the effects change dynamically depending on use situation.

The findings suggest that the relative advantage of mobile payments is related to the specific benefits provided by the new mobile technology; time and place-independent payments, remote and ubiquitous access to payment services, and the possibility to avoid queuing and to complement cash payments. Furthermore, the findings indicate that the relative advantage becomes more important in certain use situations including the presence of queues, an unexpected need to make the payment, time pressure, and lack of cash or loose change. The most compatible application areas for mobile payments include electronic ticketing, purchases on vending machines, mobile content and services, and payments at POS. Preferred maximum payment size varied from micropayments (max 10€) to lower macropayments (10–100€).

Factors found to inhibit mobile payment adoption include complex solutions, premium pricing, low adoption rates, perceived risks and perceived incompatibility with large value purchases. These findings suggest that in order to create volume, mobile payments need to be better integrated with existing financial and telecommunication infrastructures. Proprietary systems with exclusive service providers and infrastructures are not likely to suc-



ceed in the long term. Instead, compatibility with consumers' existing services and common standards between different service providers could facilitate adoption.

Based on prior research on consumer life cycle stages (Brown and Venkatesh, 2005) it was expected that different groups would perceive mobile payments differently and use them for different payment purposes. The present study, however, found the groups to be quite similar in their preferences of mobile payments. It is possible that the stages of consumer life cycle have no direct impact on the adoption of mobile payments. Another explanation could be that because mobile payments can currently only be used to pay for a limited set of items, the implications of consumer life cycle stages are not yet fully visible.

### 6.1. Theoretical implications

This study provides several theoretical contributions to the existing body of research on information systems and mobile payments adoption. First, our findings indicate that the relative advantage of mobile payments was determined by the enhanced availability of the mobile technology, the perceived independence of time and place, ability to avoid queues, and the ability to complement traditional services (cash payments). These findings are in line with previous studies on mobile services adoption and use, which have proposed the independence of time and place as a specific advantage of mobile services (Carlsson et al., 2006; Constantiou et al., 2006). Compared with the traditional technology adoption theories, the relative advantage of mobile payments is different from the traditionally highlighted performance advantages (Davis, 1989; Moore and Benbasat, 1991). Our findings thus suggest a need to re-conceptualize the relative advantage construct to better capture the specific features of mobile technologies. This need is supported by Orlikowski and Iacono (2001) who propose a shift from general adoption models to theories that capture the distinctive characteristics of specific technologies. The mobility construct proposed in this study represents such a shift, yet being generalizable across a range of mobile technologies and services. The contributing items for relative advantage listed in Table 3 can be used as measures for the new construct. To guide future theory development regarding the relative advantage of mobile technologies, we propose the following research question:

*RQ1:* Is the proposed relative advantage construct more powerful in predicting the adoption of mobile payments and other mobile services than the traditional measures of relative advantage/usefulness?

Second, the results of this study suggest that situational factors impact consumer decision to adopt and use mobile payments. These results support prior HCI research that has found significant correlations between situational factors and the use of mobile services (I. Lee et al., 2005). Contemporary mobile adoption research (see, e.g., Nysveen et al., 2005; Wu and Wang, 2005), however, has not widely studied the effect of situational factors on mobile commerce adoption. The findings of this study, as well as evidence from prior research, suggest that situational factors may be important determinants to mobile services adoption and should thus be included in the adoption models. Regarding the conceptualization of use situations, the situational factors found in this study; lack of alternatives, hurry, presence of queues, and sudden need, correspond with the categorization by Belk (1975) and thus support the applicability of his categorization in mobile payments research. From a methodological perspective, our experiences indicate that focus group methodology is applicable in exploring influential use situations. Electronic

focus groups (see, e.g., [Kontio et al., 2004](#)) could be used to facilitate data collection and analysis. Specific research question includes:

*RQ2: What are the effects of different situational factors on mobile services adoption compared with other adoption determinants?*

Third, our findings suggest the importance of compatibility, complexity, network externalities, trust, and cost factors on consumer adoption of mobile payments. The findings support previous studies on technology adoption that have postulated compatibility and complexity (ease of use) as significant adoption determinants ([Moore and Benbasat, 1991](#); [Teo and Pok, 2003](#); [Wu and Wang, 2005](#)). Network externalities have been commonly discussed in adoption research in connection with reaching critical mass (see, e.g., [Rogers, 1995, p. 313](#)) but few adoption theories actually incorporate the construct and measure its effect. One exception is the study of [Li et al. \(2005\)](#) who found that critical mass is positively associated with the perceived enjoyment and usefulness of instant messaging. Our findings suggest that consumer perception on the amount of merchants and other consumers using mobile payments influence their adoption decision and should be incorporated in the models that predict mobile payment adoption. Further, our results support the importance of trust in influencing the consumer adoption of mobile payments. Our findings also augment the existing research on trust within E-commerce that commonly examines trust in merchants only ([Siau et al., 2004](#)). Our findings suggest that trust may have multiple objects; in our case the interviewees discussed trust in not only merchants but also payment and mobile network service providers.

Finally, the findings suggest a partial adoption pattern where mobile payments are adopted and used side by side with traditional payment instruments: the interviewed consumers were willing to use mobile payments in specific use situations and for specific purchases but not to substitute them for existing payment systems. The traditional technology adoption models, however, are based on the assumption that new technologies are introduced to replace the old ones ([Davis et al., 1989](#); [Moore and Benbasat, 1991](#); [Rogers, 1995](#)). Our findings suggest the need for a more dynamic adoption model that is able to describe the adoption of mobile payments that complement existing payments and are preferred under certain situational conditions. The partial adoption theory would provide insights into the acceptance criteria on complementing technologies, and predict the circumstances and conditions under which the new and old technologies are used. In addition to mobile payments, the theory could be applicable to explain the adoption of many other electronic and mobile services. Contemporary research on electronic commerce adoption provides important insights into the characteristics of channels and adopters that influence the choice between electronic commerce and traditional stores ([Gupta et al., 2004](#)). Our findings indicate that situational factors may also influence these choices. Specific research questions proposed are:

*RQ3: Which factors determine the choice between different technologies in a multi-channel and multi-device environment?*

## 6.2. Practical implications

This study provides important strategic guidelines for organizations that consider adopting mobile payments and for the practitioners that develop mobile payments. Regarding organizations' strategic decisions on investing in mobile payments, we expect that applications most likely to succeed are those that consumers find compatible with

mobile payments. These applications include ticketing, purchases at vending machines and other self-service machines, and mobile content and services. The areas of mobile payments can then be extended, for example, to POS purchases when mobile payments become more mature and evolve to suit these payments.

Regarding development strategies of mobile payments, our findings suggest that more attention should be paid in the usability and convenience of the systems. Consumers perceived the codes and service numbers that are required in SMS-based payment transactions as complex and difficult to remember. Similarly, consumers disliked solutions that have complex registration procedures and require a separate account for mobile payments. The fact that usability problems have also been major issues of previous payment systems (Szmigin and Bourne, 1999; Van Hove, 2001) suggests that more effort needs to be made to develop easier and more user-friendly systems.

The premium pricing of mobile payments had a significant negative impact on consumer adoption willingness. Mobile payments that pass the transaction costs to consumers are not likely to succeed unless they are able to provide superior advantage. Mobile payment providers should therefore carefully analyze and select the pricing models for their services in order to ensure the success of these services. As a strategic implication, our findings indicate that business models should not be reliant on charging the consumers for using the mobile payment alternative.

The lack of positive network externalities and perceived critical mass emerged as a major barrier to consumer adoption in the present study. One viable strategy for practitioners to create critical mass is to launch the new payment service initially in an area where there is a large base of established users, such as in public transportation, and then develop the market by gradually including more application areas (Szmigin and Bourne, 1999). Another means for creating critical mass would be to obtain a critical mass of users on one side of the market through incentives, and thus attract the remaining side to also adopt the system (Evans and Schmalensee, 2005, p. 143). Developers should also cooperate and establish common standards, instead of developing proprietary solutions, to increase positive network externalities.

To overcome consumer concerns on mobile payments security, providers need to offer consumers sufficient payment documentation and clearly communicate the implications of errors in transaction procedure. It may also be beneficial for small mobile payment providers to cooperate with more established players to win consumer trust.

### *6.3. Limitations and suggestions for future research*

As with any empirical research, this study has limitations. One of them is that the empirical data was collected in one country. Different countries have notable differences in the use of mobile payments and services and the research findings may therefore vary from one country to another. Asia, particularly Japan and South Korea, for example, is currently considered as the most advanced area with Europe and the US coming second and third (Taga and Karlsson, 2005). Finland is similar to Western Europe, in mobile phone penetration and use of mobile payments: mobile payments are mostly used to pay for mobile content and services, and SMS is still the most common technology (Menke and de Lussanet, 2006). Use patterns may, however, vary significantly between European countries, depending on cultural differences and market conditions (Menke and de Lussanet, 2006; Snellman, 2006). Future research is there-

fore required to further test and validate the findings of this study in different countries and cultural contexts.

Another limitation of this study is that the data was collected already in 2002. Few major changes in the commercial mobile payment applications have, however, taken place since the data collection. For example, SMS-based mobile payments still dominate the market and notable players such as PayPal Mobile expect to use them also in the future (Wolfe, 2007). More importantly, we believe that the theoretical constructs postulated in this study remain valid predictors for the adoption of mobile payments. It is therefore expected that the findings are valid and topical even today. Future research is needed, however, to test the proposed factors with new technologies such as contactless RFID and to contribute to the theory development in this evolving research area.

The methodology of the study, focus group research, also presents limitations in terms of small sample size. Especially the external validity, which refers to the extent to which findings can be generalized, can be a challenge in qualitative research due to small sample sizes. Lee and Baskerville propose generalizability to theory instead of to population as an alternative for information systems studies. This study applies their approach and generalizes the current findings to theory by identifying relevant factors and measures in a systematic way to support the emerging research on mobile payments adoption. Future research can then be conducted to test the adoption factors presented in this study with different methods and larger sample sizes. This approach indicates that future research on new technologies and their adoption would benefit from using a multi-method approach where rich description and new insights are first gathered with qualitative methods and the new theoretical implications are then further tested with additional methods.

Further suggestions for future research include the examination of the dynamic nature of mobile payment adoption and an investigation into whether a similar partial adoption is characteristic of other mobile services, too. As another more general avenue emerging from the present findings, future research could examine whether and how different situational factors impact the adoption behaviour of consumers in multi-channel and multi-device environments.

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