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# MOBILE PAYMENT SERVICE DEVELOPMENT – MANAGERIAL IMPLICATIONS OF CONSUMER VALUE PERCEPTIONS

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## ABSTRACT

*In recent years, a number of new payment solutions have been introduced with little success. The solutions have mostly been technology driven at the cost of convenience and value to the consumer. In this research in progress we investigate what characteristics of mobile payment solutions increase or decrease consumers' willingness to adopt these solutions. We also specify managerial implications for the guidance of consumers' payment solution adoption. As a frame of reference for understanding and explaining consumer value perceptions we use three befitting theories: Consumer perceived value (Grönroos, 1997), Technology acceptance model (Davis et al., 1989), and network externalities theory (Shapiro & Varian, 1999). We conducted four focus group interviews for data collection. The results imply that mobile payment solutions are perceived to be valuable for small everyday purchases and other small purchases. There are, at the same time, still many concerns related to e.g. security and pricing. Ease of use, security, low transaction costs, and wide applicability of the solutions increase perceived customer value and should be managed by mobile payment solution providers. This research indicates clearly that only technically driven development may lack relevance for the potential users of mobile payment solutions.*

## 1 INTRODUCTION

In recent years, several mobile payment solutions have been introduced to commit retail payments. New solutions are typically “pushed” to consumers by the efforts of payment solution providers - banks, mobile operators, IS vendors - or payment instrument issuers - banks, credit card companies, mobile operators, other service providers. New mobile payment solutions employ i.a. mobile wallet, public key infrastructure (PKI), and (secure) wireless identity module (SWIM/WIM) standards and technologies. In Europe, the solutions run currently in GSM, WAP or GPRS handsets. Several industry consortia and interest groups such as GSM Association, WAP Forum, UMTS Forum, Mobey

Forum, Radicchio, PKI Forum and MeT promote competing and/or overlapping development efforts reported e.g. in Strategy Analytics (2001), Forrester Research (2001), Gartner Group (2001), Mobey Forum (2001) and Böhle and Krueger (2001). Institute for Prospective Technological Studies keeps an updated list of European electronic payment systems including mobile payment systems (<http://epso.jrc.es/>).

As newest telecom and IT/IS technologies are involved it is understandable that technical issues receive a lot of attention in mobile payment solutions literature. Yet, questions such as what benefits can consumers expect from new payment solutions, what factors drive consumers to adopt new payment solutions or inhibit them from doing so, or how should solution providers manage the penetration of their payment solutions among consumers have received surprisingly little attention. We stress this point as, apart from web-based banking systems, not only mobile payment but most electronic payment solutions in general have failed or their penetration has remained far lower than expected. The failed mobile payment solutions include WAP-payment solutions, that were introduced into the Nordic market too early, and which were perceived as overly complex by consumers (Mallat, et. al., 2001). Well known international electronic payment solution failures include eCash, ePurse and other electronic money applications and a number of smart card solutions, which failed as they did not accumulate critical user mass needed to create positive network externalities for their users. For detailed discussion of network externalities see (Katz & Shapiro, 1986; Shapiro & Varian, 1999).

We claim that although technical limitations or poor design might have slowed down consumer acceptance of mobile payment solutions it is, in the current situation, even more important to understand which characteristics of such solutions create value to consumers. We further claim that by understanding consumer value perceptions it is possible to conclude what aspects of consumer technology acceptance should be managed by payment solution providers. If our claims are correct the implication is that (mobile) payment solution providers should consider carefully how they deploy resources along their value chain between different development tasks.

In this research in progress conducted jointly by Helsinki School of Economics and a large Finnish telecom company group our aim is to investigate what characteristics of mobile payment solutions increase or decrease consumers' willingness to adopt these solutions and to conclude what are the managerial implications for the guidance of consumers' payment solution adoption. As there is to our best knowledge no publicly available data about consumers' mobile payment behavior and as there is very little empirical evidence about consumers' value perceptions related to mobile payment solutions, we conducted four focus group interviews for data collection. The target of the focus group interviews was to understand consumers' payment behavior and mobile payment solutions related value perceptions, and to generate research topics for our 1 ½ year research project, which will end in June 2003. We investigate the issue in the Finnish mobile payment environment characterized by following features:

- The penetration of mobile handsets is close to 80 % among consumers, and more than a half of the mobile phones are WAP capable, thus well suitable for mobile payments.
- Published mobile payment solutions include applications of all main payment methods as defined in finance: direct debit (mobile debit card), credit card (mobile credit card), cash (mobile cash, purse, accounts) and payment against bill (mobile bill presentment and payment, direct debit of mobile payments from savings and demand deposit accounts).
- More than 75 % of retail (consumer) payments are conducted electronically via electronic point of sale (POS) terminals, ATMs, electronic banking, Internet banking, mobile banking or mobile payment solutions.

Consumer research literature proves that experiences, beliefs and individual characteristics have an impact on consumers' value perceptions. As the use of mobile payment solutions is currently very low among all consumers our focus is on the characteristics of payment solutions, not on differences between consumer segments or in the phases of technology adoption. However, we point out that the low penetration of mobile payments impacted our focus groups. To record at least some experience

based results we opted to interview consumers that could be characterized as early adopters and/or experienced in understanding/using mobile services.

One of the difficulties in any payment research is that payment concepts are difficult to define. As Böhle and Krueger (2001) note, payment culture matters. In this research payment is defined as the transaction in which monetary values are transferred from one party (payer) to another party (receiver) directly or via an intermediary such as a bank. Payments are usually compensations for acquired physical or digital products/services and are carried out with payment instrument such as coins or bills. In this research payment solution is used as the concept which incorporates payment method, payment instrument, payment system, payments transaction parties and other attributes of payment transactions.

## **2 CLAIMED BENEFITS OF MOBILITY AND PREVIOUS EMPIRICAL RESEARCH**

To our best knowledge there are no previous scientific empirical studies, which would have investigated what characteristics of mobile payment solutions create value to consumers and lead to consumer adoption of mobile payments. Michelle de Lussanet from Forrester Research has conducted mail surveys among almost 10 000 consumers but these results are not publicly available and provide limited evidence to our research questions. Some of the industry consortia, most notably Mobey Forum and MeT, have defined so called payment use cases. The consumer benefits of mobile payments are not considered directly unless the ability to model these use cases for mobile payment solutions is considered such. Mobile payment literature dominated by commercial market research reports (e.g. Strategy Analytics, 2001; Forrester Research, 2001; Gartner Group, 2001; Mobey Forum 2001) proposes that mobile payment solutions have at least the following benefits:

- Ease of use; ease of use is claimed to be created by single sign-on and the use of mobile handset, sometimes called the trusted personal device. For example, mobile PKI solutions use PIN codes for identification and authorization/electronic signing. The ease of using two PIN codes and a mobile handset is compared to electronic/Internet banking with multiple one-time keys and PCs, and in the physical world to having multiple cards or going to a bank branch
- Security; superior security is claimed to be created by user specific PIN codes, closed and operator controlled mobile networks with all network transactions registered, secured network traffic, and payment transaction certificates. This is compared to the claimed insecurities of Internet, and in the physical world to the need to carry cash

Some other overall or payment solution specific claimed benefits are:

- No notes or coins needed as mobile cash is always available
- Cash, wallet or account loading is available everywhere 365/24/7 independently of ATMs
- Ability to handle micro-payments (smaller than 10 Euro/USD down to fractions of cents)
- Bundling of services and payments
- Overall advantages of mobility
- Fastness of transactions from the beginning to the end of the transaction

As empirical evidence on mobile payment benefits is limited we looked at the results of some close by research topics. To begin, there is a wide research base on the issue why consumers select electronic or traditional payment channels. As we refer to this literature we intend not to describe in detail the characteristics of the potential users and non-users of mobile payment solutions nor the generic framework of alternative payment channel selection. For the latter issue we refer to our earlier paper (Mallat et. el., 2001). In this paper, we focus on the attributes of the services that create perceived value to consumers.

Electronic payment channels in general offer relative advantages in terms of accessibility, convenience, speed, privacy and control for conducting financial transactions (Birch & Young, 1997; Daniel, 1999; Ramsay & Smith, 1999). Similarly, the most important reasons for using human clerks are appreciation of personal service (Thornton & White, 2001), lack of access to or skills with new technologies, and security concerns (Ramsay & Smith, 1999). Electronic payment channels are self-service oriented and are therefore preferred in simple routine service transactions, whereas complex payment and other services are mostly conducted in banks' branch offices (Mallat et al., 2001).

In terms of user characteristics, empirical research indicates the importance of attitudinal and social behavior and product category involvement compared to socio-economic factors. (Lockett & Littler, 1997; Machauer & Morgner, 2001) Self-service distribution channels have higher usage rates among customers who have favorable attitudes towards convenience, change, computers, technology, and who feel more confident using electronic banking and who are knowledgeable about the methods of accessing their money (Thornton & White, 2001).

By looking at research conducted on the benefits of various payment methods we noticed that so far smart card solutions been the most serious challengers to traditional cash. Compared to cash payments the perceived advantages of smart card payment solutions had not yet outweighed their perceived disadvantages especially lack of security, low speed, and complexity. The exceptions include situations where incentives have been offered, where limited area cards (e.g. "campus cards") have been used, or where small amounts of exact notes or coins were needed. (Szmigin & Bourne, 1999; Plouffe et. al., 2000)

Also studies, which investigate consumers' willingness to use new mobile services in general provide valuable suggestions to our research. As the amount of this research is currently increasing rapidly, we limited our review to recent Finnish research (Eriksson et. al., 2001; Järvelä et. al., 2001; Rajas & Tinnilä, 2001) as our research also includes Finnish consumers. The most important finding of these studies has been that the use of mobile services is very limited. The most active users of mobile services are (1) specialists in information and communication technologies industries, (2) men, and (3) persons to whom their employers' have given mobile phones and who do not have to pay the mobile phone bills themselves. According to consumers' experiences the needs of ordinary consumers have often been neglected in the development of new mobile services and they vote with non-use. On the other hand, the studies indicate that all age groups are ready to adopt value-added mobile services provided that such services can demonstrate clear value propositions to consumers.

To summarize, on the basis of previous empirical research little is known about the real or perceived benefits of mobile payments, about how these benefits relate to those of the competing payment solutions, about the drivers of mobile payment solution adoption, and about the reasons of previous mobile payment solutions failures. The managerial implication so far is that mobile payment solutions development should include careful and detailed analysis of consumer benefits – at the same time as the development is also heavily driven by technological understanding and technology limitations. We offer the following remarks:

- It is necessary to view payment solutions from customer's point of view. Only technically driven development may lack relevance to the customer.
- Payment solutions must be built on unfulfilled identified needs within clear consumer segments.
- Payment solutions incorporating new technology may require substantial behavioral change. This may cause psychological discomfort and a reluctance to adopt. A risk-free trial or other educational means may help to overcome this problem.
- Consumers must be able to understand what the payment solution is; what benefits it provides, and how to use it. This requires careful communication with consumers in their language and solutions that are consistent with such communication.

### 3 THEORETICAL FRAMEWORK

From available theories we selected three theories to be used in the planning of the empirical part of our research and as the frame of reference for understanding and explaining the empirical findings. The criteria of theory selection were their ability to describe how characteristics of products and/or services are related to the adoption of new (payment) technology solutions. The selected theories are: Customer perceived value (Grönroos, 1997), technology acceptance model (Davis et al., 1989) and network externalities theory (Shapiro & Varian, 1999). To put user value perceptions into the context of new service and product development and to derive meaningful managerial implications we also created a model discussed later.

#### 3.1 User value and technology acceptance

Customer Perceived Value: The ability of a company to provide superior value to its customers is regarded as one of the most successful strategies in new service development. (Grönroos, 1997) presents the following equations to describe customer-perceived value:

$$\text{Customer Perceived Value (CPV)} = \frac{\text{Core Solution} + \text{Additional Services}}{\text{Price} + \text{Relationship Costs}}$$

Applied to our research, the core solution is the ability to pay with a specific method. Additional services are the service features related to this specific payment method, e.g. credit services or mobility. Price is defined as the price/cost of payment. Relationship costs are comprised of three different types of costs. First, direct relationship costs that occur when the customer has to invest on a specific technology to be able to use the payment solution. Second, indirect relationship costs that occur if the offering does not function as promised and finally, psychological costs that materialize when a customer fears that problems will occur in the relationship. The empirical research question is to find out whether customer perceived value is greater for mobile payments than for alternative already existing payment methods. The managerial implication is to maximize the value of mobile payment solutions, to avoid relationship costs, and to secure positive relationship effects.

Technology Acceptance Model (TAM): The TAM model (Davis et al., 1989), belongs to the school of innovation adoption with an emphasis on technology. Rogers (1995) proposed on his general theory of diffusion of innovations that there are five characteristics relevant to the adoption decisions: relative advantage, complexity, trialability, comparability, and observability. The TAM model, described in Figure 1 below, addresses directly individual customer’s willingness to use technology, in our case mobile payment solutions. The TAM model proposes that two particular beliefs, perceived usefulness and perceived ease of use, are the primary drivers of new technology acceptance. Later Davis defined *perceived usefulness* as “the degree to which a person believes that using a particular system would enhance his or her job performance” and *perceived ease of use* as “the degree to which a person believes that using a particular system would be free of effort”. The managerial implication is to impact usefulness and ease of use perceptions with marketing, dialogue with consumers and with the design quality of the payment solution.

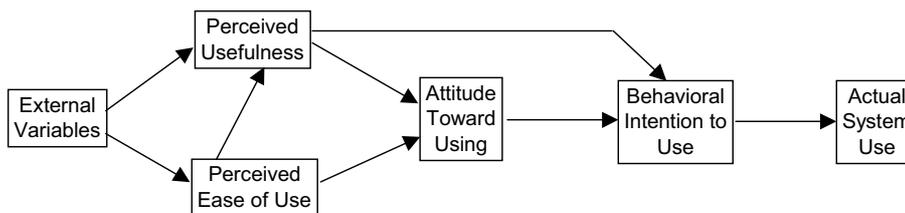


Figure 1. Technology Acceptance Model (Davis et. al., 1989)

Network externalities: One of the fundamental features of network products is the consumption benefits they confer upon consumers. These benefits are called positive consumption externalities or network externalities (Shapiro & Varian, 1999). The externality value of a network to a potential adopter depends upon the adoption behavior of others. According to the theory the value increases as the network expands, that is the number of users and services increase (Kauffman & Wang, 1999). The managerial implication is to carefully follow adoption and to promote the quick adoption of the solution with the help of pricing, marketing, educational means, alliances, etc.

### 3.2 Technology acceptance contingency model

User value perceptions are only one factor, which impacts the success of new service and product development, for a comprehensive literature review see Johnes and Storey (1998). To incorporate other development factors to consumer value perceptions in a managerial context we created a contingency model shown in Figure 2 below. The model is partly derived from the model presented by Javalgi and Ramsey (2001). Their model includes four key factors, which impact the diffusion of global eCommerce; information technology and telecommunication, social/cultural, commercial, and government/legal factors. We have modified the generic model for our research so that eCommerce is replaced with mobile payment solutions. Due to the nature of these factors they can be labeled as contingency factors as we do in our model. We use the model to describe the overall managerial context of mobile payment solutions - a specific application area of the global eCommerce.

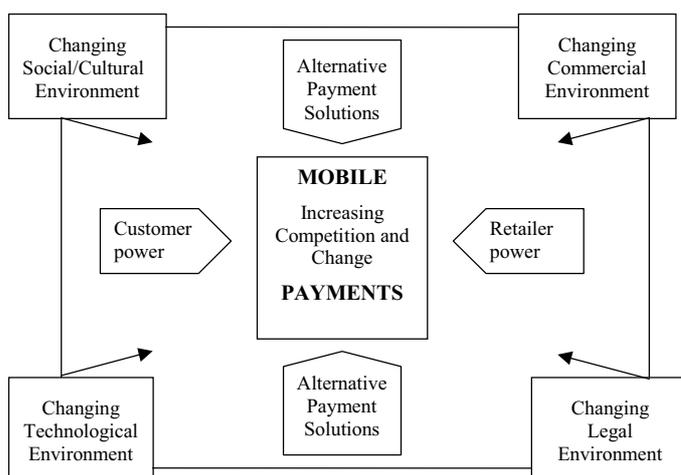


Figure 2. Technology Acceptance Contingency Model.

To this model we added elements from the study of Jayawardhena and Foley (2000). They used the same four contingency factors as in Figure 2 and described them as the driving forces of financial service development along with additional competitive factors. They claim that the changes and developments in these factors result in increased competition and changes. As examples they mention the increased use and importance of technology, deregulation and convergence of businesses, globalization and increasing competitive pressures, and changes in the social and cultural trends. In our model, contingency factors act in the background and create the environment for the adoption of new mobile payment solutions. Although contingency factors are in most cases beyond the control of individual companies and their managers it is necessary to take into consideration these forces and their interrelations. The managerial implications of consumer value perceptions is that also these perceptions are to large extent beyond the control of individual companies but success or failure of new payment solutions may depend on the ability to understand their implications.

## 4 EMPIRICAL RESEARCH AND DISCUSSION ON RESULTS

We used the focus group methodology to collect data. Four sessions included eCommerce researchers, experienced developers of mobile services from a mobile operator and IS science students. The members in each group are potential early adopters and were expected to have knowledge and previous experience on electronic and possibly mobile payment solutions. All sessions were tape-recorded and lettered. We started each session by asking what payment solutions they use currently, how payments are related to their purchase decisions, and what characteristics of payment solutions they consider valuable. We then directed the sessions to the questions: in what situations would you like to pay with mobile devices, what characteristics of mobile payment solutions impact your willingness to use such solutions, what are the alternatives to mobile payments, and what characteristics should an ideal mobile payment solution have. Note that managerial implications are included only indirectly. For full results see (Dahlberg et. al., 2002).

Six of the fifteen interviewed had tried mobile payments: bills paid in direct debit mode with WAP banking services, acquisition and payment of movie tickets, acquisition and payment of car parking and car wash services, acquisition of soft drink and candies from unmanned kiosks with a mobile phone. In addition to successfully completed acquisition and payment transactions, respondents had also negative experiences mainly related to technical reliability (mobile payment systems failures) or complex user interface (too many steps, difficult logic, too slow). The results of these interviews shown in relation to the background theories and to be verified in future research and to be compared to the perceptions of average consumers are:

- Customer perceived value – additional services: Mobile wallets / smart cards were seen valuable for small purchases of physical / information goods / services, and for purchases from unmanned kiosks.
- Customer perceived value - price: Responses were negative to increased costs, i.e. interviewees did not want to use mobile payment solutions if the price was higher than with conventional payment solutions.
- Customer perceived value - relationship costs: Mobile payments should not require difficult, multi-step procedures. Security of mobile handsets - fragility of handsets, theft, forgetting, division of loss costs in case of fraud - caused doubts. This in strong contrast with the proponents of mobile payment providers. On-line mobile payments of retail store purchases with or without WLAN based POS terminals raised also doubts due to security issues. Banks, including major credit card issuers, were perceived as the most trusted providers of the mobile payment solutions. Mobile operators were trusted if there were no other options.
- Technology acceptance model – usefulness: Mobile payment was considered useful, if it is able to compensate numerous plastic cards. As a whole interviewees regarded new payment solutions valuable if their lives would become easier. Examples mentioned included payments for meals with a campus card, car park fees, purchase of movie tickets and payments of other small purchases and fees. At the same time the interviewees were satisfied with their current debit card payment systems and internet bank payment services. They also wanted to concentrate their payments and financial affairs to one service provider. These are clear challenges to mobile payment solution providers and to service providers.
- Technology acceptance model – ease of use: Ease of use was considered to be the most important aspect of mobile payments. Note that this is in contradiction with the TAM model, which stresses the role of usefulness. The idea to use PIN codes for identification and authentication was seen to improve the ease to use.
- Network externalities: The interviewees had very strong opinions about network externalities requirements. Universality and wide acceptance of mobile payment solutions were considered prerequisite for routine use and large-scale penetration of mobile payment solutions. The

interviewees' opinion was that currently mobile payments did not have enough applications and useful services. This is another challenge to mobile payment solution providers.

From the managerial point of view, the research highlights the importance of ease of use, low transaction costs, security and wide applicability of the mobile payment solutions. The push based marketing of the new solutions will not be successful if the value of the new solution for consumers is not in place or if committing mobile payments increases transaction costs. Consumers should be involved in the development of the new solutions. One interesting finding was that all groups agreed that they trust banks as mobile payment service providers compared to mobile telecom operators. Other payment service providers were not considered trustworthy. Another finding, perhaps related to the Finnish culture, was that all groups wanted to control their consumption and debt. Mobile credit cards – credit cards in general – and large purchases paid in mobile operators' bills were disliked. As a whole, more obstacles than benefits were seen for mobile payments at the time of the interviews.

Caution with our results is necessary for several reasons. Due to the nature of data collection and the limited number of interviewed statistical testing cannot be used. We interviewed persons who are early adopters and were expected to understand or imagine what mobile payments are like. As a result they did not represent average consumers. Our future research will contain perceptions of wider variety of different consumers, including late adopters.

We used focus group interviews to collect information about a phenomenon, which is currently emerging and therefore poorly understood. The target was to increase understanding regarding issues of payment solution adoption among consumers for future research. As we hoped the interviews opened several venues for future research. As mobile payment solutions come more widely available it is possible to investigate consumers' selection of competing payment solution alternatives in real life situations. Another venue is to investigate the impact of various design features such as the interplay/trade-off of complexity and functionality, e.g., how does the number of strokes and/or elapsed time impact consumer value perceptions.

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