

# PROCEEDINGS

**SECOND INTERNATIONAL CASHLESS SOCIETY ROUNDTABLE (ICSR)**

**DUBLIN, IRELAND, APRIL 17 & 18, 2013**

**Editors Fergal Carton and Jonas Hedman**

Sponsored by the Financial Services Innovation Centre, University College Cork, Copenhagen Finance IT Region (CFIR), and the Department of IT Management, Copenhagen Business School.

## SOME WORDS FROM THE ORGANISERS

The 2nd meeting of the International Cashless Society Roundtable (ICSR) in Dublin generated lively debate on the migration to cashless payment instruments across all payer and payee demographics and contexts. Bringing together academics, regulators, banks and solution providers, the meeting shed new light on the challenges of the evolution away from cash. We heard about innovation in financial services, gained perspective on the complex relationships in the payments ecosystem, and, crucially, discussed the cultural and social issues surrounding a perceived consumer preference for the anonymity and privacy of paying with cash.

Most encouraging was the emergence of a consensus that the adoption of electronic payments instruments is a behavioral issue, rather than a technological one, and that, as we have proved many times in Ireland, even the most entrenched behavior can be changed. Greater awareness and transparency regarding cost, response time and security of the available payment instruments is required among consumers and merchants alike. The research agenda of the ICSR proposes to nurture this awareness, most immediately by creating greater understanding of the payments landscape in Europe. The meeting was opened by His Excellency Niels Pultz, Danish Ambassador to Ireland, who emphasised that from a European perspective, we haven't yet begun to realise some of the potential synergies between member states in Europe with respect to the integration of financial services, and that practitioners and academics should not overlook the political willingness to see such initiatives bear fruit."

Ireland's National Payments Plan was unveiled by Tony Grimes, an ambitious roadmap for transforming payments in Ireland. Gary Conroy of Realex showed how the more important stakeholders in the payments ecosystem are tending to extend the services they offer. Consumer-facing electronic payment solutions are extending towards the physical point of sale, and beyond that into payment processing. Traditional banks, guardians of direct access to customer accounts and interbank settlement schemes, are extending outwards towards customers to provide greater levels of integration. However, researchers from Sweden had evidence that this disintermediation of traditional payments relationships can cause fragmentation, confusing the consumer with multiple payment schemes.

Two views of payments innovation were juxtaposed at the meeting. From a banking industry viewpoint, on the one hand, we heard how innovation has been stifled by the investment of resources in lengthy SEPA initiatives for commonality in cross border payment instruments. On the other hand, payment solution providers view the banks' tight grip on current account access (ACH) as the single greatest impediment to innovation. Examples from Europe illustrate the possibilities of leveraging "credit push" transactions, for example, neatly twinning the legacy credit transfer transaction with internet or mobile customer access. Such examples suggest that opportunities will emerge when the different stakeholders play to their strategic strengths, instead of competing head on.

The difference between anonymity and privacy was discussed with respect to a fondness for cash for particular types of payment context. The use of pre-paid cards for electronic payments that dissociate the identity of the payer from the payment instrument guarantees anonymity, whereas exploiting customer information gathered via their use of a payment instrument is a privacy issue.

The conclusion of the roundtable in Dublin is that payment opportunities that satisfy both social and commercial requirements will emerge through co-operation among stakeholders. It is the goal of the ICSR to foster this emergence through the continued development of a European network uniting regulators, service providers and academics.

Next rendez-vous in Stockholm in April or May 2014.

Thank you from the roundtable committee: Fergal Carton (University College of Cork), Jonas Hedman (Copenhagen Business School) and Jan Ondrus (ESSEC Business School).

## PROGRAM

### Day 1, Wednesday 17 April, the Boyne Suite (B1)

- 08.30 Coffee and registration
- 09.00 Welcome by Fergal Carton, Financial Services Innovation Center, UCC
- 09.15 Roundtable opening by Niels Pultz, Danish Ambassador to Ireland
- 09.30 Strategy for Ireland's payments future, Tony Grimes, National Payments Plan
- 10.00 Encouraging innovation in payment services, Gary Conroy, Realex
- 10.30 Coffee
- 11.00 Panel session: "International perspectives on the evolving payments landscape"  
*David Birch, Hyperion Consulting*  
*Jan Ondrus, ESSEC Business School*  
*John McCarthy, Fexco*  
*Jill Anderson, PostPoint*  
*Fergal Carton, UCC*
- 12.30 Lunch
- 13.30 A Framework for analysing digital payments as multi-sided platforms, Erol Kazan
- 14.00 Panel session: "Developing integrated multi-channel payment solutions: the challenges"  
*Ronnie O'Toole, Central Bank*  
*Sean Jevens, PaddyPower*  
*David McLoughlin, Vodafone*  
*Phil O'Reilly, UCC*
- 15.30 Coffee
- 16.00 Lessons from Swedish mobile payments market, Jan Markendahl/Tatjana Apanasevic, KTH
- 16.30 Spending behaviour: Cash vs Debit card, results from an experiment, Emma Svensson, CBS
- 17.00 Partnership Management in M-Payment Business Models, Denis Dennehy, UCC
- 19.30 Dinner at FXB Buckley, Pembroke Street, Dublin 2

### Day 2, Thursday 18 April, the Boyne Suite (B1)

- 08.30 Coffee
- 09.00 Unlocking the payments market: customer engagement, Brendan Dowling, Digital Trading
- 09.30 Is Ireland ready for a "Less-Cash Society", Alan Hanrahan, UCC
- 10.00 Trends in financial service innovation, Jonathan Kidd, Bank of Ireland
- 10.30 Coffee
- 11.00 Panel session: "Borderless and Cashless: SEPA implications for merchants and consumers"  
*Marc Hemmerling, ABBL*  
*Jonathan Kidd, Bank of Ireland*  
*Andrew McFarlane, Accenture*  
*Jonas Hedman, Copenhagen Business School*  
*Fergal Carton, UCC*
- 12.00 Barriers to commercialisation of NFC pilots in Western Europe, Tatjana Apanasevic, KTH
- 12.30 Lunch
- 13.30 Industrial dynamics and the transition to a cashless society, Niklas Arvidsson
- 14.00 Wrap-up session with conclusions, research actions and plans for ICSR 2014 (Stockholm)
- 14.30 Close

## PARTICIPANTS

### **Accenture**

Justin Hayes

### **Accenture**

Andrew McFarlane

### **AIB Merchant Services**

Nick Bigham

### **AIB Merchant Services**

Robbie Doherty

### **AnPost**

Jill Anderson

### **Bank of Ireland**

Jonathan Kidd

### **Bank of Ireland**

Joe Doyle

### **Bank of Ireland**

Kay Cooney

### **Central Bank of Ireland**

Tony Grimes

### **Central Bank of Ireland**

Ronnie O'Toole

### **Central Bank of Ireland**

Seamus Ruddy

### **Copenhagen Business School**

Jonas Hedman

### **Copenhagen Business School**

Erol Kazan

### **Copenhagen Business School**

Emma Svensson

### **Danish Embassy**

Niels Pultz

### **Digital Trading**

Brendan Dowling

### **Enterprise Ireland**

Ciara Fitzpatrick

### **Escher Group**

John Wall

### **ESSEC**

Jan Ondrus

### **Fexco**

John McCarthy

### **Hyperion Consulting**

David Birch

### **Irish Payment Services Organisation**

Russell Burke

### **Luxembourg Bankers' Association**

Marc Hemmerlinc

### **Monex Financial Services**

Mai de Barra

### **PaddyPower**

Sean Jevens

### **Realex**

Gary Conroy

### **Royal Institute of Technology**

Jan Markendahl

### **Royal Institute Of Technology**

Tatjana Apanasevic

### **Royal Institute Of Technology**

Niklas Arvidsson

### **University College Cork**

Phil O'Reilly

### **University College Cork**

Alan Hanrahan

### **University College Cork**

Denis Dennehy

### **University College Cork**

JB McCarthy

### **University College Cork**

Fergal Carton

### **Vodafone**

David McLoughlin



# PANELS

## INTERNATIONAL PERSPECTIVES ON THE EVOLVING PAYMENTS LANDSCAPE

### Pannellists:

**David Birch, Hyperion Consulting**

**Jan Ondrus, ESSEC Business School**

**John McCarthy, Fexco**

**Jill Anderson, PostPoint**

**Fergal Carton, UCC**

This panel discussed the barriers and incentives to electronic payments in an international context.

Significant points raised were:

- Players in the payments ecosystem work in “co-opetition”, frequently straddling several layers of the business model: this might be seen from the bottom up, where the same investment interests are present in the banking, card schemes, acquiring, merchant acceptance and consumer app layers (eg. Vocalink). Banks might well wonder how far upward they need to extend into the commercial value chain to maintain market share of payments. Or this might be seen from the top down, where an internet payments solution extends downwards towards point of sale and account clearing activities (for example, an electronic wallet from one of the card schemes could potentially dis-intermediate all the other players in the model). An example of top-down integration from Danish research would be Yapital, moving from consumer services downwards into financial services.
- The MCX initiative by major retailers in the US is another example of such a top-down approach, where retailers allow access to ACH current accounts via loyalty programmes, with the use of a proxy service for identity authentication.
- In the retail sector, one of the principle challenges for merchants is speed, where a 3 second delay at the till for a small payment in a convenience store can make the difference between a queue forming or not. Merchants are consequently not interested in payment products that incur a transaction time penalty.
- A critical issue for the development of innovative payment solutions is gaining fair, open, transparent and direct access to ACH customer accounts, at a commercially valid rate: this would put payment institutions on an equal footing with banks, and therefore is not being pushed by the major stakeholders, which has the effect of stifling innovation.
- Consumers and merchants are not necessarily aware of the advantages of one instrument over another, and therefore there is a requirement for an education / communications exercise prior to successful adoption. Critical in understanding these payment options is the “payment flow”: who owns the account, where is the account, how is it funded, how are transactions made in/out of the account?
- Merchants would prefer a “credit push” akin to a credit transfer operation, the payment being pushed by the consumer means less of an issue with repudiation. Services that could build on this legacy capability would represent an opportunity.
- There is a difference here between anonymity (I don’t want my business seen by prying eyes, particularly the tax man) and privacy (I don’t want my details to be shared with Google). Consumers won’t wait for the perfect solution, they will adapt to the payments mechanisms that best suit their requirements for anonymity and privacy.
- Historically the notion of permission marketing has been poorly implemented: organisations have tended to share customer information without necessarily obtaining the customers permission. Regulation can play a role here in circumscribing the use of payment related information without payer/ payee consent.

## DEVELOPING INTEGRATED MULTI-CHANNEL PAYMENT SOLUTIONS: THE CHALLENGES

### Panelists:

**Ronnie O'Toole, Central Bank**

**Sean Jevens, PaddyPower**

**David McLoughlin, Vodafone**

**Phil O'Reilly, UCC**

Cash still offers the ultimate in settlement response time and anonymity, but is limited to physical proximity payments, and therefore imposes logistical and administrative constraints on the payee. Such constraints can be eliminated through electronic payment instruments, but the investment in infrastructure must be borne by the payee, the payer, or both. This panel explored how to incentivise people from all demographics, including the unbanked, to move away from using cash towards different payment channels. Key points raised by the panelists were:

- The physical safety of members of the public and security staff in dealing with a bearer instrument like cash needs to be considered, including the safety of employees in the different cash distribution chain (Cash in Transit professionals, Garda, credit unions, merchants, post offices, ...), particularly in rural areas. The role of the regulator was discussed, where different stakeholders are involved then perhaps a more holistic view of the regulation of payments might be beneficial (incorporating Trade and Industry, Communications, Financial Services, ...).
- The decline of cheques will be slow as some demographics are attached to them (elderly), and the Central Bank won't withdraw support for them. There was discussion around the prevalence of cheques in Ireland and the late payment culture, where the payer tends to opt for the most sluggish payment instrument available. This can even turn out to be part of commercial brinksmanship, as in the case of the "slow bet" described in the gaming industry, where time taken to process the bet manually allows more time to gather and digest information about the odds as the event approaches.
- On the other hand, many arguments can be used to minimise the flow of paper (cash, cheques, ...) such as the environment, hygiene, taxes, leveraging network effects in particular payment ecosystems, amnesty for cheque books, ...
- Changing customer behaviour is a challenge, it is easier to start new services than close down existing ones. However, there was general consensus that good value can overcome the most reticent of customers to the perceived visibility that electronic payments affords commercial or public bodies of what is being spent by whom: people would be prepared to forego the anonymity of cash if the convenience (or other value proposition) is clearly demonstrated.
- In certain sectors of retail cash usage is actually growing, with the advent of newer pre-paid cards allowing anonymous electronic payments (eg. uKash, NetTeller, and Scريل). The relationship between these newer instruments and legacy instruments is not well understood. In some cases these uses are not foreseen, for example, pre-paid cards being used for P2P payments. Likewise, customers will combine on-line and off-line payment instruments in the way that suits their requirements for liquidity and anonymity. The example was given where on-line winnings from gaming were transferred to a pre-paid card account and then withdrawn as cash at the bookies.
- The panel felt that national payments strategies should be nuanced to allow for the different payment contexts. For example, a fondness for cheques among the elderly is not an appropriate terrain for winning hearts and minds for electronic payments. Conversely, tackling the late payment culture among SME's in Ireland by promoting an amnesty for cheque books, or taxing the use of cheques, such measures would have an overall beneficial effect on the economy.
- In the meantime, Mobile Network Operators (MNO's) have conceptualised the SIM as a "hotel" where different services may be rented out (merchant loyalty programmes, payment apps, and ticketing apps).

*Developing integrated multi-channel payment solutions: The challenges.*



## **BORDERLESS AND CASHLESS: SEPA IMPLICATIONS FOR MERCHANTS AND CONSUMERS**

### **Panellists:**

**Marc Hemmerling, ABBL**

**Jonathan Kidd, Bank of Ireland**

**Andrew McFarlane, Accenture**

**Jonas Hedman, Copenhagen Business School**

**Fergal Carton, University College Cork**

The benefits of the development of a common European payments protocol may be thought of in economic and social terms. Cross border payments represent a significant market for public, private and not for profit organisations. This panel explored the economic and social factors influencing the success of standardised European protocols for emerging payment instruments. Key points raised were:

- SEPA is the electronic equivalent of the introduction of the Euro, setting a standard for cross border interbank transfers, and paving the way towards account portability across countries.
- Corporate services will emerge over time eg. Target 2 RPGS
- SEPA imposes changes on the manner in which financial services organisations operate in the Euro-zone, and these changes may not be fully understood. Financial institutions are undertaking large scale investments in SEPA readiness projects, draining resources away from other more innovative developments such as e-bill presentment.
- Investment in SEPA compliance for legacy instruments (DD and credit transfer) is having the effect of “dumbing down” products and instruments to the lowest common denominators
- There are four ways for banks to achieve SEPA compliance:
  - > Build systems and processes in house
  - > Use existing software
  - > Negotiate bilateral agreements with other banks
  - > Contract with Deutsche Bank
- IAs standards evolve, the burden of retrospective testing (on behalf of credit card schemes, for example) falls to banks, which is expensive.
- In terms of exploiting single Euro payment opportunities, SEPA represents only step one of a series of 10 steps, therefore it is currently a dangerous place to look for opportunities.

# **PRESENTATIONS- WITHOUT PAPERS**

- National Payments Plan: Setting a Strategic Direction for Payments Strategy for Ireland's payments future, Tony Grimes, Chairman, NPP Steering Committee
- Encouraging innovation in payment services: comparing the card acquiring business to ACH transactions, Gary Conroy, Chief Operating Officer of Realex Payments
- Unlocking the payments market: customer relationship engagement, Brendan Dowling, CEO and founder of Digital Trading
- Payments innovation in Financial Services, Jonathan Kidd, Strategy and Planning Manager, Bank of Ireland

# PAPERS

## A FRAMEWORK FOR ANALYZING DIGITAL PAYMENTS AS MULTI-SIDED PLATFORMS

Ph D candidate Erol Kazan and Professor Jan Damsgaard  
Department of IT Management, Copenhagen Business School

### Abstract

Near Field Communication (NFC) is a promising digital payment technology that is expected to substitute cash. However, despite its potential, NFC-based payment has not reached mass adoption on the customer nor on the merchant side. This paper constructs a preliminary framework for studying digital payment systems as multi-sided platforms (MSP). When synthesizing our observations, we note that multi-sided payment platforms can provide fully functional and technically solid NFC payment systems. Payment platforms seek to gain foothold by subsidizing NFC payment instruments to their existing customer base. In addition, they extend their existing platform with other contactless services, thereby transforming existing cards (SIM or debit) from single-purpose to multi-functional cards. Our research extends existing payment literature from the MSP perspective to accommodate technological developments, where technology (NFC) and platform design impact market actor strategies and complementary products.

**Keywords:** Payment, credit cards, multi-sided platforms, Near Field Communication (NFC), contactless payment, mobile payment, payment infrastructure.

### Introduction

The next generation of new payment instruments is expected to replace cash<sup>1</sup>. One candidate that tries to tackle this topic is Near Field Communication (NFC), on which many players in the payment landscape are placing their bets. Through contactless cards, MicroSD cards and mobile phones, NFC is transforming traditional cards (SIM cards, debit cards or loyalty cards) from single-purpose to multi-functional cards that are also capable of hosting several other contactless applications (e.g., ticketing). However, there is a long journey to widespread use and adoption of contactless payment instruments. Payment cards are complex systems that need two sides, cardholders and merchants, in order to create a viable platform. Many technologies, e.g., the fax machine and email, are simpler: the more users, the greater the benefits (i.e., each adoption creates an externality to the others). In the case of payment cards the externalities are considered indirect. One client's adoption of the payment card does not directly benefit any other client, because the receivers of the payment card are merchants, and not the other clients. Generally, orchestrating the successful implementation of a technology with indirect externalities can be more challenging than implementing a technology with direct network externalities; however, the rewards may be higher and the position easier to defend.

Payment systems have not received much attention in the past. Since 2002, however, scholars have emphasized considering payment systems with their corresponding payment cards as so-called two-sided platforms that need to attract both merchants and cardholders. Almost all papers point to network externalities (Rochet et al., 2002); multi-homing, i.e., carrying different payment cards (Chakravorti et al., 2004); and acknowledging the importance of getting both sides on board, where one side is mostly subsidized to create a successful payment card (Evans et al., 2005). Rochet and Tirole (2002, 2003a, 2003b, 2006) examined, in a series of research papers, payment cards as two-sided platforms or markets, where payment cards need to attract both merchants and cardholders to

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<sup>1</sup> <http://www.zdnet.com/news/nfc-and-the-war-on-cash/6358558>

create membership and usage externalities. Wright (2004) describes two-sided platforms that are able to link two distinct types of groups, which obtain value from interacting with users from the other site on a common platform. Referring to payment cards schemes, he outlines that these platforms cater to cardholders and merchants, and that the conventional logic of one-sided markets is not a suitable approach to describe the payment card industry.

However, these papers do not consider recent technological developments in the payment landscape, particularly, how payment cards are transforming from a single-purpose card to a multi-functional card, thus evolving from a two-sided to a multi-sided platform. The strategic implications are: First, the NFC technology itself has impact on how contactless payments work in practice, enabling platform providers to include or exclude other market actors or services. Second, the platform usage (moderated or free) has a substantial effect on the diffusion of complementary products (e.g., apps that incorporate an element of payment) that are helping to fertilize the core platform. Third, current incumbents (e.g., banks) are leveraging their existing cardholder base to diffuse new NFC technologies (supply-push strategy), to create in rapid fashion an installed user base. To address the research gap, the following research question can be formulated:

*How do incumbents and contenders engage themselves in providing the next generation digital payment platform and what strategies do they employ?*

To answer the research question, we construct a framework that considers contactless payment cards as MSPs. The framework enables exploration of how market actors design their platforms, in order to gain leadership. To demonstrate the usefulness of this framework, we analyze current market actors, including banks, mobile network operators, and merchants, whom we have identified as either incumbents or contenders, and who are currently actively jockeying for NFC platform leadership.

The contribution of this paper is twofold: First, the framework can be utilized to identify and develop digital payment platform strategies to increase adoption on the cardholder and merchant side. Second, learning from the NFC adoption as an example, we believe this framework is also applicable beyond the payment domain in areas where digital technology is the platform enabler. Since we see a steady convergence of virtual and physical objects (e.g., Internet of Things), this framework can also provide a general understanding of how digital platforms, combined with a technology element (hardware or software) are designed to create network effects.

### **Digital Payment Framework**

In this section, we present our “*Digital Payment Framework*”, which is a synthesis of related works and existing literature, which we have identified of being essential to create viable mobile payment platforms.

Traditionally, value creation has been achieved through a number of incremental steps from raw material to products and services (Porter, 1985). This worked well for industrial products, but recently, platforms that create value by facilitating interactions between different groups have created an interest as an analytical lens for understanding value creation. We adopt the notion by (Hagiu et al., 2011) and define a multisided platform (MSP) as “*an organization that creates value primarily by enabling direct interactions between two (or more) distinct types of affiliated customers*“. MSPs are either digital, such as search engines and operating systems, or physical, like shopping malls, game consoles or printed newspapers that are attracting at least two distinct groups, both of which have the demand to interact

with each other. Search engines, for instance, join searchers and advertisers; meanwhile, shopping malls are connecting shoppers and merchants (Hagiu et al., 2011).

The platform organization itself thereby acts as an intermediary, which can be operated either by one or more entities, which are called platform providers. The primary task of a platform is to coordinate and facilitate the direct interactions in a controlled manner, thereby providing the architecture and a set of rules for each participant. In general, the value of a MSP is highly dependent on the number of users on both sides (Eisenmann et al., 2006). To describe the logic of new digital payment platforms, we adapted the framework by Hagiu and Wright (2011) that demonstrates the general logic of MSP, which we have extended to represent a digital payment ecosystem and we especially emphasize the technological solution.

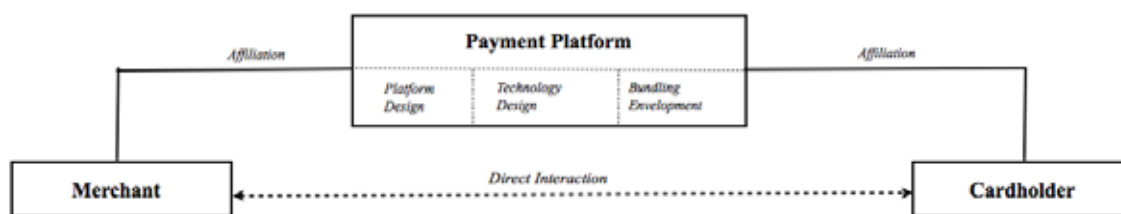


Figure 1. Digital Payment Ecosystem

**Direct Interaction** is the key criterion for classifying a platform as multi-sided. For instance, the music and movie store iTunes by Apple connects content providers (music and movies) with buyers. However, if one reads the terms of use, it is actually a direct commercial purchase contract with Apple and not with the studios; therefore, iTunes is acting solely as a re-seller platform and not as a MSP in this case. Contrary to the iTunes store, according to the terms of use, the Apple App Store is indeed a MSP, which enables a direct commercial interaction between software developers and the buyers. In consequence, to classify a platform as being multi-sided or not, the contract design that specifies the direct commercial relationships is an important aspect for the classification (Hagiu et al., 2011).

**Network Effects** are one characteristic of network effects, which can further be distinguished as same-side network effects and cross-side network effects. Same-side network effects increase or decrease the value of one side of the platform. If we take game consoles as an example, users value a certain console if it has many users and a variety of games to offer, creating an incentive to exchange with other users, which is a positive same-side effect. For other platforms, however, a negative same-side effect can occur when there are too many of its own kind on a platform, making it unattractive to show affiliation. For example, sellers value marketplaces with fewer sellers in the same manner that single men prefer dating clubs with fewer men, to avoid competition. Cross-side network effects are apparent when users value the other side of a platform, e.g., when advertisers are attracted by a much-visited online portal (positive cross-side effect), whereas too many ads create a negative effect on the reader side. To lower the hurdle for one side, most platform providers subsidize one side (subsidy side), to ensure that network effects have a chance to take effect. If a MSP has been able to create a strong installed user base, the money side gets mostly attracted to obtain value from these users (Eisenmann et al., 2006). As an example, Google has reshaped the entire online advertisement industry to offer highly contextual ads to searchers (subsidy side), where online advertisers (revenue side) are willing to pay premium prices for online clicks.

**Homing Costs** are expenses (adoption, operation, opportunity costs) that arise when users are affiliated with a platform. Homing costs include any kind of investments/costs incurred due to platform

affiliation. It basically consists of three cost components. First is upfront cost: search, initial investment and training. Second are on-going costs: membership fees, maintenance cost. Finally, exit costs include salvage value of hardware/software and termination costs. For instance, many computer users are able to use one operating system well (e.g., Windows), which requires from the individual user commitment and resources, in a timely as well as financial manner. In addition, homing costs differentiate in their value. Homing costs are low, if systems are convenient and easy to adopt and to use. Thus, the likelihood to multi-home different systems at the same time is given. For example, holding different payment cards is – for most individuals – a common issue, because the payment card in its current form is a standardized product that can be easily switched and adopted from various financial service providers, which thereby exhibits low homing costs (cf. Eisenmann et al., 2006).

**Switching Costs** are high when users made significant and durable investments to a certain platform and into complementary assets (homing costs), thereby creating a hurdle to switching to an alternative platform. As a result, they are faced with a lock-in effect (Shapiro et al., 1999). For example, IT managers at large corporations think very carefully before they make the decision to switch to another IT system (cf. Damsgaard et al., 2010).

**Bundling and Envelopment:** Platform leaders shouldn't rest on their achievements when the threat of being enveloped is evident. Platform owners can be *enveloped* when competitors enter (or sneak in) into their market and offer the same functionalities by bundling it with their existing products, and at the same time, having essentially the same customer relationship (Eisenmann et al., 2006). *Bundling* is a form of versioning where two or more single products or services are offered as a package (Shapiro et al., 1999). As an example, Netscape was once the dominant internet browser, but it has been enveloped through Microsoft's Internet Explorer web browser, since Netscape users were also users of Microsoft's Windows operating system. Microsoft sneaked in into the browser market by bundling Internet Explorer with its operating system. Nevertheless, standalone platform providers can strengthen their position, if they bundle their offer with other services, either to increase their value proposition or to act preemptively against competitors.

**Platform Design (Platform & Complementary Products):** To make sense of platform strategies and how complimentary products are distributed, we adopted the framework (figure 2) by Iyer and Henderson (2010), to analyze the logic of different types of platforms and the distribution of products (applications). *System development dimension (Y-axis)* MSPs can be characterized as being closed or open systems that determines the degree of involvement through third parties. Closed systems exclude third parties from any platform modification, where Apple serves a good example. The iOS by Apple is a closed mobile operating system, allowing – with its walled garden approach – control over every aspect on the mobile device, excluding thereby any third parties from platform development. On the contrary, Google's Android mobile operating system is *open source*<sup>2</sup>, allowing third parties significant modifications. *System usage dimension (X-axis)* Systems differentiate as to how complementary software can integrate with the system. Software developers for Windows, for instance, don't need the permission of Microsoft to build software using Windows, which represents the *free* approach. The moderated approach is accompanied by rules, where complimentary software is distributed in a controlled manner. The app development for iOS devices, serves an example that requires Apple's per

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2 <http://source.android.com/about/index.html>



mission to be on the platform. Through these two dimensions, we can derive four platform strategies (Figure 2). In general, moderated systems have the benefit of guaranteeing a unified user experience, whereas free systems offer greater variety.

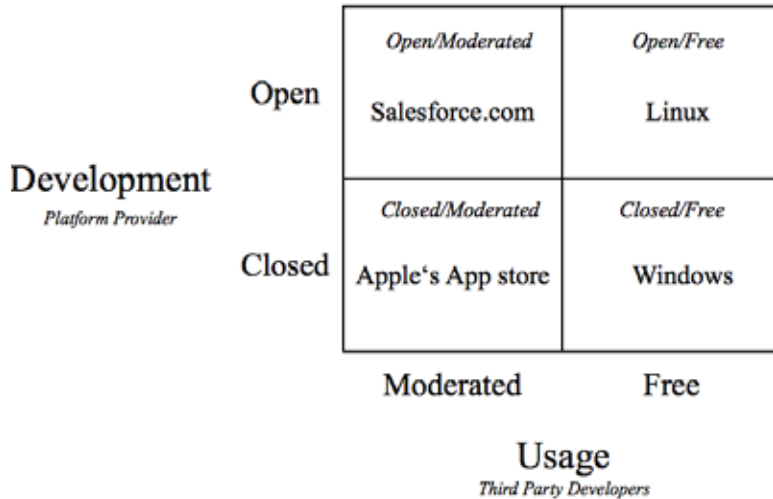


Figure 2. Digital Payment Ecosystem

### **Technological Solution: Customer Ownership and Hardware**

**Customer Ownership:** Different platform designs enable asserting different types of control on third parties and on their complementary products (see figure 2), which have also implications on end users. By controlling the customer relationships, platform providers can extract revenues (fees) and depending on the level of control, it can claim customer ownership. In addition, a protected hardware infrastructure can serve as a second defense and a second layer of control, to protect value creation. Payments, especially at the checkout counter are dominated by hardware, i.e. payment cards and terminals. This provides the payment platform provider a greater effect on control, excluding third parties and owning the customer by hindering alternatives.

**Hardware** can be categorized into evolutionary or revolutionary products (cf. Shapiro et al., 1999). Evolutionary products offer a migration path to a new technology and at the same time backward compatibility to old systems. As an example, applications developed for Microsoft's OS Windows 95 were also running on Windows 98 systems. Lastly, revolutionary products offer a better performance, however, representing a riskier approach, since the technology itself is in most cases not compatible with the old technology, thus with the existing user base. To understand platform logic of modern payment systems, the interplay of platform design and the technological solution (e.g. NFC payment cards) is relevant to assess the efficacy of modern payment platforms. In order to explore the aim of this paper, we tailored from the aforementioned theories a digital payment framework, to explain contemporary payments systems:

Table 1. The Digital Payment Framework

Criteria: MSP	Description
<b>Direct Interaction</b>	Classifies a platform as being a Multi-Sided Platform.
<b>Network Effects</b>	Illustrates the attractiveness of a platform that can draw users, based on cross-side effects or same-side effects.
<b>Homing Costs</b>	Costs of adoption, which serves as an indicator for platform affiliation.
<b>Switching Costs</b>	Points to lock-in effects.
<b>Bundling &amp; Envelopment</b>	Threat of envelopment through prospective competitors who enter the payment market and have shared customer relationships. Platform owners can counteract envelopment through bundling to increase their value proposition.
<b>Platform Design</b>	Describes open and closed systems and how complementary products are distributed.
<b>Technological Solution</b>	The applied technology that determines customer ownership, accompanied through an evolutionary or revolutionary hardware strategy.

### Discussion and Conclusion

When synthesizing our observations and providing an answer to our research question, we can conclude that all MSPs have the potential to provide fully functional and technically sound NFC payment systems. Platform providers subsidize and leverage their existing customer base to diffuse NFC payments. They plan to bundle their platform with other contactless services, thereby transforming existing cards (SIM or debit) from single-purpose to multi-functional cards (i.e., being multi-sided). On the merchant side, acquirers are also contributing to the diffusion process, by offering payment terminals bundled with NFC. It can be noted that bundling is an effective (Trojan horse) strategy to diffuse new technologies to customers (cf. Shapiro et al., 1999). In addition, the strategy of bundling offers a higher value proposition, which is, in essence, a preemptive action to exclude other competitors from the value creation process. Parallel to that, the NFC technology itself serves as a technical and second barrier to exclude market actors from the expected value creation process. All players follow a closed and moderated platform approach that provides a unified user experience and control about the distribution of contactless applications, in other words, control over revenue streams. All three payment platforms are offered by incumbents, but from separate areas.

This paper adds up existing mobile payment literature (cf. Carton et. al., 2011), and the usefulness of our framework falls into three parts. First, it is a conceptual tool that builds on existing payment literature from the MSP perspective, to accommodate recent technological developments, where technology (NFC) and platform design impact market actor strategies and complementary products. Second, it identifies and assesses the efficacy of NFC payments systems as MSPs. Third it detects potential threats of envelopment through competitors who have relationships with the same customer. From the practitioner's view, this framework is relevant to assess their current market position, which can be utilized to (re)design effective contactless payment platforms or other platforms based on cloud computing and hardware. This paper has limitations, since we have only dealt with payment and used primary data based on secondary resources to illustrate the usefulness of the study framework. Its predictive power and verification is not a part of this research. For further research, the collection of firsthand data could be useful in order to validate the framework. It would also be interesting to analyze NFC payment systems by similar actors to find commonalities and differences.

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## MOBILE TICKETING: IT IS NOT ONLY ABOUT “CASHLESSNESS”

Jan Markendahl\*, Tatjana Apanasevic\*, and Niklas Arvidsson\*\*

\*Wireless@KTH, Royal Institute of Technology

\*\*Department of Industrial economics and management, Royal Institute of Technology

### Abstract

In Finland and Sweden, SMS payments were introduced in the public transportation sector in order to replace cash payments for single tickets on buses. SMS payments are also used in other areas where the main driver is cash replacement; vending machines, public toilets and parking ticket.

However, mobile and SMS payments are used in many other areas where the use of the mobile phones provides other opportunities and drivers. Mobile payment services are not only about the payment itself or the transaction, the mobile phones can be used as a communication channel to the users. The mobile phone can be used before a purchase, during and after the purchase. The SMS ticket for the public transportation is a very good illustration of these aspects:

- The mobile phone is used as a ticket machine (to buy a ticket);
- The phone subscription is used for the payment;
- The phone carries the ticket (used for ticket issue);
- The phone is used for validation (using manual inspection or an optical reader).

Hence, a mobile payment service is much more than the transaction, the payment is one part but other types of services and values can be added. In a Swedish research project with public transportation companies KTH researchers look into mobile services for the public transport. The mobile services include integrated solutions for information services, ticketing and payments. For the public transport sector, payment and ticket solutions is one way to attract new types of customers, to decrease barriers for users and to increase the use of public transport in general. These mobile services mainly target segment that do not use public transport on a daily basis, both car drivers (that never or seldom use public transport) and those that quite often (but not always) use public transport. From a research perspective, it is interesting to study mobile services for public transport since it is used by many persons – and often. If mobile payments can take off in this area it may be an “island” that can grow.

In the paper we will present different user and travel situations for different market segments, i.e. types of users. A multitude of travelling situations can be presented by different combinations of local, regional and long-distance means of transport (see Table 1). For each segment and types of travel we identify critical situations and the need for ticketing, payment and information solutions.

Table 1. Matrix representing different travelling situations.

Market segment	Witing SL/UL	UL <->SL	UL<-Sj->SL	SL/UL-Sj->xL	xL-Sj->SL/UL
	Local	Regional		Long distance	
<b>Everyday user</b> (always, most of the times)	1				
<b>Changing user</b> (sometimes)	2	4	5	6	
<b>Car driver</b> (never, seldom)	3				
	*SL stands for Stockholm public transport company (StorStockholms Lokaltrafik), UL – Uppsala public transport company (Upplands Lokaltrafik), Sj – Swedisg Railroads (Statens Järnvägar), and xL – any local transport company or a public transport company situated in another region.				

Consequently, different user categories have different sets of needs. During a pre-study stage, we have identified different sets of needs and performance of existing solutions in terms of prices, time, flexibility, convenience, and etc. We have identified several solutions that are good or bad (or underdeveloped) from a user perspective. Additionally, we have identified solutions that do not work (although they should), and obstacles that should be removed in order to increase or facilitate the use of public transport. Research findings are briefly discussed below.

1. An **Everyday user of SL/UL** has a good knowledge about the public transport, its ticketing and pricing, and uses the public transport to travel to (and back from) work or study on everyday basis. The size of this segment in Stockholm is about 39%. The most common type of tickets used by this category of users is monthly or longer term tickets. Possible additional service that could be provided to this category of users is additional informational service on alternative routes in the case of longer traffic problems and in critical situations.

2. A **Changing user of SL/UL** easily switches between different means of transport combining a car, a bicycle and the public transport. Averagely, users belonging to this category use the local public transport (SL/UL) for travelling few times per week. The size of this market segment in Stockholm is about 26%. The most predictable types of ticket solutions used by changing users are single SMS tickets or prepaid tickets on the cards. Possible additional services that could be provided to this category of users are mobile trip planners, additional informational service on alternative routes or parking information.

3. A **Car driver** uses **SL/UL** very seldom and performs most of the travelling by a car. The size of this segment in Stockholm is about 35%. The most predictable types of tickets used by changing users are single SMS tickets or prepaid tickets on the cards. Possible additional services are mobile trip planners, information on traffic and parking.

4. A **Changing user** travels using **UL<->SL** sometimes. One of the resent mobile ticketing solutions proves to be highly successful for this market segment. That is a ten-time UL/SL ticket suggested at a competitive price compared with other available options.

5. A **Changing user** on the way from Uppsala to Stockholm can use another solution that is **UL<-SJ->SL** (e.g. bus in Uppsala, SJ train from Uppsala to Stockholm, and underground or bus in Stockholm). However, this solution takes more time than the previously discussed. In addition, it is more expensive (124 SEK one way compared to 72 SEK in the case of **UL<->SL**).

6. Completely different situation is related to long-distance trips (**SL/UL-SJ->xL**) performed by a **Changing user** or a **Car driver** (e.g. bus and/or underground in Stockholm, SJ train from Stockholm to Gothenberg, and local public transport in Gothenberg in order to reach a needed destination). A user having little or no previous experience of such a trip needs a good informational service during all the travelling time. Additionally, during the pre-study stage, we have identified that there is no integrated and convenient ticketing and payment solution for this category of trips. Meaning, that an “All-in-One” ticketing service (including SL, SJ and xL tickets) is not available. An alternative travelling solution is a local flight from Stockholm to Gothenberg.

To summarize, these cases highlight the different needs and the performance of different service solutions. In the paper we will present the drivers and obstacle for these the travel cases and how a (mobile) payment/ticket/information service can be designed to reduce (or increase) barriers for using public transport. During the spring 2013 we will conduct interviews and focus group sessions with travellers in order to assess the usability of existing solutions and to collect the user view in future solutions.

## PAYMENT AS A FUNCTION OF CONTEXT AND VALUE: A CONJOINT ANALYSIS

Emma Svensson, Jonas Hedman, and Xiao Xiao, Copenhagen Business School  
Department of IT Management, Copenhagen Business School

### Introduction

Many studies have investigated how people choose between cash and card. These studies are typically concerned with demographic and socio-economic factors, convenience, and characteristics and transaction costs of the payment method that influence the likelihood of possessing and using a payment card (see e.g. Stavins, 2001, Klee, 2008, Humphrey, 2010). These studies contribute to our understanding of what drives the aggregate shares of different payment instruments but they fail to take into account how consumers' preferences depend on the purchasing context. Previous research in the marketing literature has established relationship between situational factors and consumer behavior (Belk, 1975). For instance, Gehrt and Yan (2004) found out that situational factors such as shopping task and product category had significant influence on consumers' online shopping behavior. In the area of payment, it is also shown that situational factors, especially payment context (including time urgency, crowding at the payment counter, and availability of other payment methods), matter when it comes to people's willingness to pay with emerging payment methods, such as mobile payment service (Mallat et al., 2009). However, in the case of traditional payment methods – cash and credit/debit card, little or none has been regarding the impacts of situational factors on people's payment choice. This study fills this gap and investigates consumers' preferences for cash and credit/debit card as a function of two important situational factors: the payment context and the value of the purchase.

Clearly, there are situations when people might prefer cash to card and vice versa. To illustrate such a situation, imagine that you are in a grocery store and that you are about to purchase a can of Coca-Cola. Your preference for payment instrument may be based on the fact that you know that stores usually accept cards and you therefore feel that it is convenient or appropriate to pay with card. On the other hand, you might feel that going through the card transaction procedure for such a low value purchase is too cumbersome so you prefer to pay with some loose change. Consumers find themselves in these situations every day where they evaluate their choices in relation to the context and the value of the purchase.

To examine consumers' payment preferences as a function of context and value of the purchase, we conduct a conjoint analysis using a 4x4 full factorial design. The conjoint method assumes that a product or service consists of a bundle of attributes. The total utility of a product/service for a consumer is thus a function of the individual utilities of the attributes. For our purpose of estimating consumer preferences for card and cash dependent on the context and value of the purchase, the conjoint method allows us to decompose the individual weights of four different contexts (store, restaurant, on street, and event) and four value intervals (up to 50 DKK ( $\approx$ US\$9), 50-100, 101-500, more than 500) to see how each of them impact the likelihood of paying with cash or card.

Using a sample of over 200 respondents from the general population in Denmark, the preliminary results suggest that people's preferences for cash and card depend primarily on the value of the purchase and secondarily on the context in which the purchase takes place. First, for amounts less than or equal to 100 DKK, the respondents clearly prefer to use cash. Thus, for small value transactions, cash seems to fill a role that debit/credit cards fail to. Second, the respondents prefer to pay with card (prefer not to pay with cash) in stores and restaurants while on-street purchases and at temporary events they prefer cash (do not prefer card). This suggests that respondents' preferences seem to be influ-

enced by how formalized the context is. From a policy stand point, this study sheds light on specific areas that can be targeted to reduce the demand for cash.

### Conjoint Analysis

Conjoint analysis, originally developed in mathematical psychology (Luce and Tukey, 1964), is a popular tool in marketing research (Green and Srinivasan, 1978, 1990) and has spread to other fields including environmental and health economics, service management, and pedagogics (Gustafsson et al, 1999 Ryan et al., 2001, Kuzmanovic et al., 2013). In a conjoint study, the respondents evaluate a bundle of attributes jointly and apply preference ratings or rankings to the specific bundle. Each attribute is broken down into levels, or factors, that the researcher varies using different factor combinations for each bundle. In a full factorial design, there are as many bundles to evaluate as there are factor combinations. The full factorial design ensures that the individual utilities for each factor, the part worth utilities, can be separated with multivariate analysis.<sup>3</sup> For our purposes of measuring consumer preferences for cash and card as dependent on the purchasing situation, the conjoint analysis thus allows us to study how much each context and different value of the purchase affect the likelihood of choosing cash/card and the weight of each factor in this choice.

We use the full profile method where respondents consider one bundle at a time which includes one factor from each attribute and we break down the two attributes into four levels each giving us a balanced design.<sup>4</sup> For context, the four levels are: *Store*, *Restaurant*, *On street* and *Event*, and for value of the purchase: *Up to 50*, *50-100 DKK*, *101-500*, and *More than 500 DKK*. We would like to define and justify the choice of four payment contexts and value. *Store* context can be characterized whether it occurs physically or on-line. The store context attempts to grasp how we pay in the everyday shopping. *Restaurant* context (pub/nightclub are possible extensions) grasps payments in public where it might be a distance (time and space) between the bill and payment due to the location of payment terminals. Street context can be characterized as temporal sales location outside a shopping context that might not be a legal entity (e.g., P2P sales). *Event* context can be characterized chaotic, short time period of sales, and queues, at temporal or permanent locations. The denomination of banknotes determined the purchasing values.

These eight factors are combined into 16 scenarios where respondents rate the likelihood of using cash/card on a scale ranging from 0 (Not likely at all) to 10 (Very likely). The rating scale is chosen since ratings are more practical to administer when using pen-and-paper surveys and the results are easy to estimate (Hair et al. 2006)

Pretests showed some ambiguity in the choice of cash versus card so we decided to split the sample and let one sample evaluate the likelihood of using cash and the other sample the likelihood of using card (debit or credit). In addition, to make the purchasing situation more realistic, we included three pictures for each context that represented the four contexts we had in mind (Green and Srinivasan, 1990).<sup>5</sup>

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3 An orthogonal fractional factorial design can also be used to ensure that the part worth can be measured independently of the variation in the other attributes.

4 A balanced design is desirable as increasing the number of levels can inflate the importance of an attribute relative to attributes with fewer levels (Hair et al., 2006)

5 A scenario description is provided in the Appendix.



## Data

The data was collected March 18-23, 2013 on the train between Roskilde – Copenhagen in Denmark. 105 respondents evaluated the likelihood of paying with cash and 109 evaluated the likelihood of paying with card. We also collected background information on the respondents and payment usage. Table 1 gives a summary of the samples displaying the similarities between them in terms of age, gender, income, occupation, education and payment usage. Only the amount of cash carried at the time of the survey is higher in the card sample. It is also noteworthy that only five of the 208 respondents who answered this question were not carrying a debit or credit card at the time of the survey. In general, card payments represent around 75 percent of all on site payment transactions, which indicates the high card usage in Denmark.

Table 1. Descriptive Data: Card and Cash (in parentheses) Sample.

Age (%)		Gender (%)		Income (%)	
15-30	43 (47)	Male	39 (48)	Under 10 000 kr	37 (45)
31-45	27 (23)	Female	61 (52)	10 000 – 14 999 kr	15 (12)
46-60	18 (12)			15 000 – 19 999 kr	11 (9)
61-75	13 (17)			20 000 – 24 999 kr	16 (9)
75-	0 (3)			25 000 – 29 999 kr	8 (8)
				Over 30 000 kr	11 (13)
Occupation (%)		Education (%)		Payment usage (average)	
Employed	45 (38)	Primary school	8 (10)	Share of cash (%)	27 (23)
Student	37 (42)	High school	31 (37)	Share of card (%)	75 (77)
Retired	14 (14)	Undergraduate	21 (21)	Cash held (kronor)	208 (121)
Other	4 (4)	Graduate	30 (28)	Cards held	1.72 (1.85)
		Other	9 (5)	(number of)	

## Analysis

Table 2 presents the part worth from OLS estimation of the main effects model without any restrictions on the parameters from the cash and the card sample. Six respondents in the cash sample and 12 respondents in the card sample were deleted from the estimation due to the same score on all scenarios.

Table 2. Estimation Results: Average Part Worths and Importance Values

	CASH Part worths	Importance value	CARD Part worths	Importance value
<b>Context</b>		39.28		43.17
Store	-0.91		1.20	
Restaurant	-1.00		0.89	
On street	0.99		-1.45	
Event	0.91		-0.64	
<b>Value</b>		60.71		56.83
1-49 kr	2.16		-2.04	
50-100 kr	1.05		-0.77	
101-500 kr	-0.96		0.87	
More than 500 kr	-2,25		1.94	
<i>Constant</i>	4.22		6.12	
<i>Number of observations</i>	99		97	
<i>Pearson's R</i>	0.996***		0.997***	

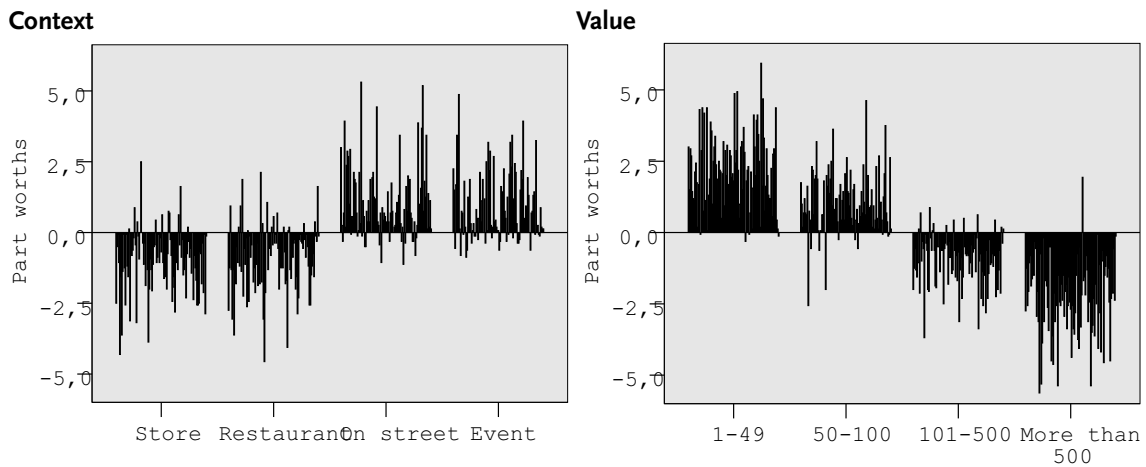
Standard errors for cash part worths 0.101 and for card 0.084. \*,\*\*,\*\*\* denotes significance at 10, 5 and 1 percent level.

The part worths are the average weights assigned to each factor and the importance value show the average importance of each attribute in respondents' preferences. First, it is clear that cash and card part worths are in principle mirror images of each other. *On street* and *event* have a positive impact on the likelihood of paying with cash and so do purchases that cost less than 100 kr. *Store* and *restaurant* on the other hand have a negative effect as do purchases over 100 kr. For card respondents, *on street*, *event* and purchases for less than or 100 kr have a negative effect while *store*, *restaurant* and *purchases* over 100 kr have a positive impact. Second, the importance values show that the value of the purchase is the most important attribute for the likelihood of paying with cash and card, 61 percent and 57 percent respectively. Together the estimated part worths in Table 2 yield the highest likelihood of paying with cash for purchases worth less than 50 kr on the street and of paying with card for purchases worth more than 500 kr in a store.

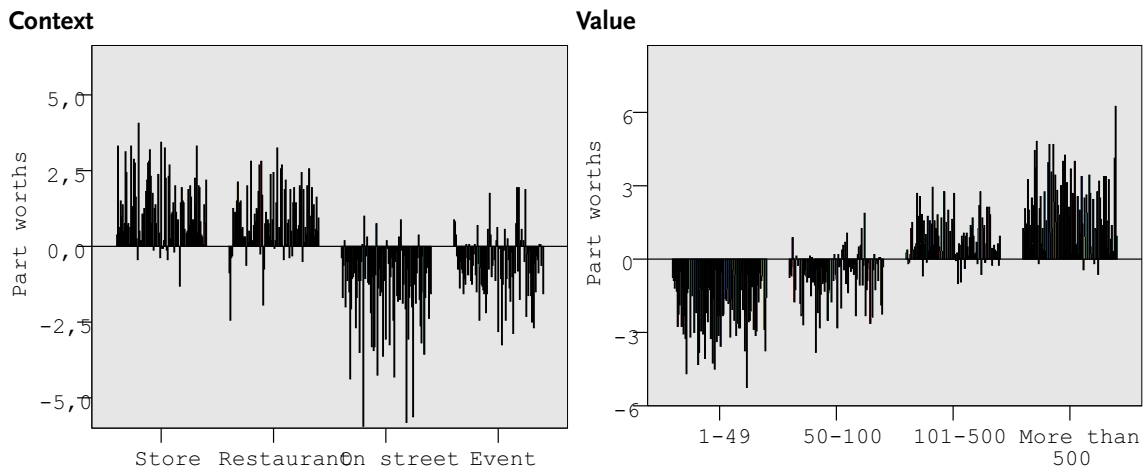
Figure 1 shows the variation in respondents' preferences for each attribute for cash and card. In general, respondents' preferences move in the same direction but there is variation in how large the impact of the different contexts and values is.

Figure 1. The Variation in Part Worths in the Cash and Card sample

**CASH**



**CARD**



**Discussion**

This study uses a simple set-up to investigate consumers' preferences for paying with cash and card and affirms the role of the context and the value of the purchase as stimuli in payment decisions. A natural question to ask is how much consumer preferences are driven by expectations about whether the vendor accepts card or not. Although a consumer might prefer to pay with card in general, this choice is not always hers to make since it depends on the available payment infrastructure of the vendor. In particular for two of our contexts, on street and event, these expectations may be driving the preference for cash. We address this question in a subsequent analysis in addition to examining whether demographic and socio-economic background variables can explain the variation in part worths between the respondents.

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## PARTNERSHIP MANAGEMENT IN M-PAYMENT BUSINESS MODELS: A DESIGN SCIENCE RESEARCH PERSPECTIVE

Denis Dennehy, Dr Fergal Carton, and Professor Frederic Adam  
Business Information Systems Department, University College Cork, Ireland

### Introduction

In a value-network such as the delivery of an m-payment service, the generation and delivery of value to the end-consumer becomes a mutual interest, and as such, the organisations involved become dependent on it each other strategically, functionally and financially (Bouwman and Ham, 2003). Co-operation in a value-network is also challenging as there is evidence that the organisations experience significant difficulties in attaining mutual benefits and because the partners are from different industries (i.e. retailers, network providers) there is potential that the diversity could disrupt the network and revenue sharing issues (Faber et al., 2004, Ballon, 2007). Consequently, creating value for actors in a value-network is challenging and complex due to their conflicting strategic interests (De Reuver et al., 2008).

In a complex value-network where the organisations are engaged in inter-organisational investments, they are connected through intended relationships and interdependencies which involve considerable risks, problem solving and having access to complimentary knowledge (Dahlberg et al., 2007, Bouwman and Ham, 2003). This complexity and combination inevitably requires such organisations to undertake a collective-decision process (Bouwman and Ham, 2003). As a result, investment decisions will extend beyond a single organisation and the value implications extend to a network (Kohli and Grover, 2008). As organisations shift from single firm revenue generation to multi-firm control and revenue sharing issues, not only are control and value issues of most relevance to business modelling, but two key questions also emerge “*Who controls the value network and the system design?*” and “*Is substantial value being produced by this model or not?*” (Ballon, 2007, p. 2).

These collective-decision processes have a number of implications when compared to internal process since no single partner has formal authority over another partner; they require prolonged decision-making processes as adjustments need to be discussed and jointly agreed, there are high costs involved and the possibility of disputes due to conflicting interests which do not always result in a win-win outcome for all stakeholders (Demkes, 1999, Klein-Woolthuis et al., 2005, Faber et al., 2004). Consequently, managers are increasingly faced with ‘wicked’ problems which are characterised by a large degree of uncertainty with respect to how the problem should be approached and how to establish and evaluate the set of alternative solutions (Pries-Heje et al., 2008). Therefore, to understand how organisations can develop ‘balanced’ business models, designers need to understand ‘design issues’ (i.e. partner selection, orchestration of activities, valuing contributions and benefits of each partner, acceptable risks, acceptable division of roles, acceptable profitability) in business models and their interdependencies (De Reuver et al., 2008).

### Leveraging Design Science Research

Information Systems (IS) research is characterised by two complementary, but distinct paradigms: behavioural science and design science (Hevner et al., 2004b, March and Smith, 1995). Both paradigms have significantly different epistemologies, behavioural science seeks to find ‘what is true’ (e.g. truth) while design science seeks to create ‘what is effective’ (e.g. utility) (Hevner et al., 2004b, Winter, 2008). The behavioural science paradigm has its roots in natural science research methods which seek to ‘develop and justify’ theories that explain or predict organisational and human phenomena

surrounding IS (Hevner et al., 2004a). While the design science paradigm has its roots in engineering (Venable, 2006), design is central to fields such as architecture, art and within the Information Systems discipline (Walls et al., 1992). The scientific view of design arises from the concepts found in Simons (1969) seminal literature, *The Sciences of the Artificial* (Pries-Heje et al., 2008), also known as design science (Baskerville, 2008) which inevitably provided a solid foundation for design science research (Venable, 2006).

As Information Systems is an applied discipline, Gregor (2002) called for the recognition of design theory as the work of IS researchers should provide guidance to individuals who have to take action in the world. By making design theory central to this study, it addresses the call by Gregor by providing guidance to individuals who have to take action in the world. A decade has passed since Gregor's call and there is now growing recognition to the benefits of adopting 'design thinking' which is acknowledged by Leavy (2010, p. 6) who states that "...*design thinking, or the creative principles long associated with the design function, may now have something very significant to offer when applied more broadly to business management and strategy development*". Further, design thinking assumes the human experience, is always 'messy', and sees true objectivity as an illusion (Liedtka and Ogilvie, 2011).

Design Science Research (DSR) in IS addresses what are considered to be 'wicked problems', or using Simon's (1973) terminology, 'ill-structured' problems (Brooks Jr, 1987, Rittel and Webber, 1974). Holmström et al (2009, p. 67) describe ill-structured problems as "*decision situations where decision-makers may not know or agree on the goals of the decision, and even if the goals are known, the means by which these goals are achieved are not known and requisite solution designs to solve the problem may not even exist*". DSR is a problem solving paradigm that seeks to 'design and evaluate' innovative artifacts with the desire to improve an environment - by introducing the artifact (Hevner et al., 2004b, Simon, 1996, Holmström et al., 2009). The iterations between design (development) and evaluate (experiment) is a significant difference between design science research and the theory-driven 'behavioural science' or natural science approach (Kuechler and Vaishnavi, 2008).

Although design is central to the activities of design science, it (design science) is more than just design practice (Baskerville, 2008). Distinguishing design science from design practice is echoed by March and Smith (1995) who describe design science as a 'knowledge producing activity' and design practice as a 'knowledge using activity'. Hevner et al (2004b, p. 81) also contrast DSR with design practice, DSR "*addresses important unsolved problems in unique or innovative ways or solved problems in more effective ways*", as opposed to design practice which "*is the application of existing knowledge to organisational problems*". Venable (2006, p. 10) provides further clarity on these two problem solving activities by stating that design practice "*... is related to a particular, situated problem (or group of problems) with specific stakeholders*" while design science research "*... should be related to a generalised (or abstracted), type, kind, or class of problems that are relevant to typical, identified classes of stakeholders*".

Although behavioural science and design science have distinct paradigms, both approaches share a common environment. This environment consists of people, organisations and technology which are the realm of IS research (Silver et al., 1995). Further, some academics view both paradigms as being complementary parts to the IS research cycle (Hevner et al., 2004a, March and Smith, 1995). Central to this research cycle are the 'relevance cycle', the 'design cycle' and the 'rigor cycle'. The 'relevance cycle' bridges the contextual environment with the DSR activities (e.g. build and evaluate), while the 'rigor cycle' bridges the DSR activities with the knowledge base of scientific theories and expertise,

while the 'design cycle' iterates between the 'build and evaluate' activities of the artifact and research processes. Hevner (2007) stresses that these three cycles must be present and identifiable in a design science research project.

March and Smith (1995) identify two design processes (e.g. build and evaluate) and four design artifacts (e.g. constructs, models, methods, instantiations) produced by DSR in IS. An IT artifact is broadly defined as constructs (vocabulary and symbols), models (abstractions and representations), methods (algorithms and practices), and instantiations (implemented and prototype systems) (March and Smith, 1995, Hevner et al., 2004a). Artifacts are "*created to enable the representation, analysis, understanding, and development of successful information systems within organisations*" March and Storey (2008, p. 726).

Hevner (2007, p. 90) states that the contribution to the knowledge base occurs as "results of the DSR will include any extensions to the original theories and methods made during the research, the meta-artifact (design products and design processes), and all experiences gained from performing the research and field testing". Nevertheless, in any design science study, a novel artifact must be produced and evaluated (Hevner et al., 2004b, Peffers et al., 2007, March and Smith, 1995, Simon, 1969). Consequently, Gregor and Jones (2007, p. 318) state that "*the construction of an artifact that is sufficiently novel is seen as a significant contribution in its own right.*"

### **Design Science Research Methodology**

Design science has been examined within Information Systems as a research method (Hevner and Chatterjee, 2010, Hevner et al., 2004b, Peffers et al., 2007, Peffers et al., 2006, Gregor, 2007, Gregor, 2006), as well as being used for conducting research on IS topics (Arnott, 2006, Pries-Heje and Baskerville, 2008). By adopting the principles of DSR, knowledge and understanding of a design problem and its solution are acquired in the development and application of the artifact.

Unlike the Waterfall model which follows a linear process, design science research frequently iterates between the development and evaluation phases (Kuechler et al., 2005). This iterative, trial-and-error type of research process is essential because the initial solution design (e.g. artifact) is incomplete and requires refinement through iterations in order to determine what works and what does not (Holmström et al., 2009).

Walls *et al* (1992) argue that IS design theory is an output of DSR, while March and Smith (1995) propose that artifacts (e.g. constructs, models, theories, and instantiations) are outputs of DSR. However, Pries-Heje *et al* (2008) believes that evaluation in DSR focuses on the evaluation of design science outputs, which includes both the artifact and the theory. DSR evaluations can be classified into two categories, 'artificial evaluation' and 'naturalistic evaluation' (Venable, 2006). Artificial evaluations evaluate the artifact in a manufactured and non-realistic environment and can either be empirical or non-empirical. This type of evaluation can include: laboratory experiments, field experiments, simulations, criteria-based analysis, theoretical arguments, and mathematical proofs. Naturalistic evaluations are always empirical and evaluate the artifact in a real environment (with real people) and essentially embrace the complexities of human practice in real organisations. The type of evaluation can include: case studies, field studies, surveys, ethnography, phenomenology, hermeneutics and action research. Venable (2006) also suggests that naturalistic evaluations can either be interpretivist, positivist, and/or critical, while the artificial evaluation can be interpretivist or critical but most often it is positivist.

Vaishnavi and Keuchler (2004) suggest that the artifact must be analysed for its use and performance, and possible explanations for the changes in the behaviour of people, organisations and systems. Hevnar (2007) believes that it is essential that rigorous testing of the artifact is carried out in experimental environments before releasing it to the 'real world' environment (e.g. field testing) for testing its relevance. The results from the field will then reveal if the new artifact has deficiencies (i.e. performance, usability) which may limit its utility or if the input requirements to the DSR are incomplete or incorrect resulting in the artifact not being adequate to the problem presented.

### **Method Adopted in Study**

Drawing from the work of Venable (2006), the evaluation methods adopted in this study can be broadly categorised as being 'artificial evaluations' and 'naturalistic evaluations'. The artificial evaluations will form phase one of the evaluation cycle while phase two of the evaluation cycle will involve naturalistic evaluations. A series of focus group sessions will take place during each phase, the use of descriptive and observational methods as proposed by Peffers et al (2006) will be adopted for phase one and phase two respectively. The value of focus groups is in their ability to facilitate the collection of rich information from targeted groups about the existence of ideas from which the researcher will evaluate the artefact. Because the intent of focus groups is to use groups as a tool for gathering data and to interpret it for decision-makers, it is a method that supports multiple sources of data gathering and presentation (Peffers and Tuunanen, 2005).

The first phase of the evaluations (e.g. artificial, exploratory) commenced in January 2013 with a pilot focus group using descriptive (e.g. scenarios) evaluations and involved undergraduate students from the Business Information Systems department in UCC. An additional two exploratory focus groups have since been carried out with practitioners undertaking the Executive MBA programme and the Executive Masters in Supply Chain Management, also in UCC. An important benefit from the artificial evaluations was that it provided the researcher with the opportunity to check the 'robustness' of the artifact before progressing to the naturalistic phase of the evaluations. Carrying out artificial evaluations prior to the naturalistic evaluations is supported by (Livari, 2007) who states that only in very exceptional, special situations should testing commence in real situations.

These focus groups enabled the authors to carry out additional 'build and evaluate' iterations of the canvas, while also progressing closer to the real-world of practitioners. In the second phase, the naturalistic evaluations will adopt the 'observational' method type and will take the form of field studies to test the utility of the artifact. The organisations involved in this phase of the evaluations are engaged in real-world m-payment value-networks.

### **Preliminary Findings and Discussion**

As the focus group participants possessed a wide range of expertise, skills and terminology specific to their diverse business backgrounds, creating a common platform for discussion was essential if stakeholder issues were to be addressed in order to design a balanced business model. After using the visualisation tool (e.g. stakeholder canvas), participants were asked if the visualisation tool improved communication amongst stakeholders. A number of participants stated that it was "good to have a model to bring together all parties" so that "everyone had a voice" as the canvas provided a "common language" for the stakeholders. Participants also commented that the canvas acted as "a vehicle for brainstorming" and that it provided the opportunity to "identify gaps", as well as "highlighting issues that had not surfaced before using the visualisation tool". Introducing the partnership canvas during the focus group was important as it revealed that although the groups believed they performed well without using the canvas, once it was introduced "more issues were highlighted" and "it put a framework on all the issues we discussed and as a result there was a clearer understanding of where everybody fitted into the process".



Partnership management is a sensitive issue that inevitably requires diplomacy, coordination and the need for a shared terminology amongst stakeholders. By leveraging visualisation tools and design thinking to improve the communication and decision-making between the multiple stakeholders, there is greater potential to designing a sustaining business model when forming a complex value-network such as m-payments.

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## IS IRELAND READY FOR A “LESS-CASH SOCIETY”

**Alan Hanrahan, Philip O'Reilly, and Aidan Duane, WIT  
Business Information Systems Department, University College Cork, Ireland**

### Introduction

For many years, the prospect of a “Cash-Less Society” in Ireland has been spoken about by academia, business leaders and legislators alike (Andreev et al., 2011; Central Bank of Ireland, 2013). However, as the Central Bank of Ireland seeks to implement the National Payments Plan (NPP), it has become clear that the predicted adoption of a “Cash-Less Society” is many years away (Central Bank of Ireland, 2013). A recent interview with Daniel McClean of the Central Bank of Ireland, instead reveals a push towards a “Less-Cash Society” rather than a “Cashless Society” by the National Payments Plan implementation team (McLean, 2012).

The “Less-Cash” strategy being pursued involves moving towards a contactless Mobile Payment (M-Payment) environment where, initially, the focus is on contactless Smart Card adoption (McLean, 2012). “Wave and Pay” contactless cards (O'Connell, 2011; Bank of Ireland, 2011) have already been introduced nationwide and Hailo, an adapted version of the London taxi “cashless personal transport” system has recently been launched in Dublin (McLellan, 2012). Thus, Irish consumers are being incrementally exposed to M-Payments and are being gradually shepherded towards participating in a “Less-Cash Society”. Ireland, because of its size, its age demographic and its relatively small banking sector presents an ideal test bed for M-Payment adoption and a “Less-Cash Society” (Digital Times, 2012).

While M-Payments can play a significant role in Ireland's economic future (Grimes, 2012) Ireland still lags behind in its adoption (Central Bank of Ireland, 2013; O'Reilly et al., 2012). Consumer focused research has revealed that cash still remains Irish consumers preferred payment mechanism (Central Bank of Ireland, 2013). With competitiveness being the key to financial recovery and with many improvements already made, Ireland's dependence on cash for payments still remains high. While M-Payments offer an efficient and cheap payment method, the most recent figures available show Irish consumers cash usage represented 14.3% of Ireland's GDP compared to just 10.1% in the euro area. This represents the second highest rate of cash usage in the region (Central Bank of Ireland, 2013; National Competitiveness Council, 2012).

Robert Mulhall, Head of Direct Channels in Allied Irish Bank sees the next step towards M-Payments as being the most complex (Digital Times, 2012). According to the Central Bank of Ireland (2013), the banking sector and retailers must adapt and understand the role they will play. However, the role of non-banking M-Payment entities such as Paypal, Google and Realex must also be considered, particularly when they have little input into the National Payments Plan (Lyons, 2013). This further complicates the Irish M-Payment landscape.

Thus, a number of important questions have emerged, and it is imperative that they be addressed. Firstly, do Irish consumers fully understand the implications of the emergence of a “Less-Cash Society” and a migration towards M-Payments? Secondly, how will the introduction of new technologies, such as Smart Cards and Smart Phone enabled M-Payments impact on Irish SME's and the retail sector (NearfieldCommunication.org, 2013; O'Connell, 2011; Bank of Ireland, 2011)? Thirdly, with the SME and retail sector playing a key role in Ireland's economic recovery, what new demands will the Irish National Payments Plan goal of doubling “the number of electronic payments by 2015” (Central Bank of Ireland, 2013; O'Toole, 2012) place on policing bodies (i.e. legislators and regulators)?

To summarise, the global M-Payment's landscape remains in a fragmented state (Crowe, 2012). A report by the US Federal Reserve (2012) states that much remains to be done from a global perspective in communicating clear value propositions to consumers and promoting trust in M-Payments (Duane et al., 2011). The “*build it and they will come*” scenario, does not apply if consumers are unfamiliar, ill-informed, and wary of new payment technologies (Digital Times, 2012). Thus, it is clear that many challenges lie ahead for Irish legislators, SME's and the retail sector with regard M-Payment adoption. The purpose of this presentation is to inform the debate on whether Irish consumers, SMEs, and the retail sector, are ready for a “Less-Cash Society” as envisioned by the Irish National Payments Plan.

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## BARRIERS TO FURTHER COMMERCIALIZATION OF NFC PILOTS IN WESTERN EUROPE

Tatjana Apanasevic  
Wireless@KTH, Royal Institute of Technology,

### Introduction

Appearance and quick penetration of multifunctional smart mobile devices (smartphones) has strongly affected consumer habits. Enhanced functionality of these devices and their provided computing capability opened up wide prospects for new application areas. One of them is an opportunity of mobile payment, which is a step leading to a cashless society.

A mobile payment can be performed in various ways. For example, the Near Field Technology (NFC) integrated with mobile devices provides an opportunity of a contactless mobile payment. However, it is not only payment. The NFC can further expand functionality of mobile phones and enrich consumer experience. Indeed, added value services created by the NFC include mobile ticketing, loyalty applications, smart advertisement, informational service, physical and logical access, and other functionalities.

However, despite NFC potential to create added value we cannot witness its wide penetration and global spread unless some successful solutions are implemented on a national level. Numerous trials and pilots are being implemented in different countries, but only some of them get continuation as commercially deployed NFC services. This is especially true for Western Europe where the level of mobile phones diffusion is high, but the level of NFC based payment solutions is low. So, commercialization of NFC mobile solutions needs to overcome a range of barriers and obstacles predefined by macro- and micro-environmental conditions, and individual factors related to consumers. And this leads to the key research question:

*What are the barriers preventing NFC pilots from entering commercialization stage in Western Europe?*

The scope of the research is limited to the analysis of six NFC pre-commercial pilots implemented in Western Europe from the period from 2006 to 2011. This paper presents a qualitative study of factors slowing down the spread of the NFC payment in Western Europe based on experience of six NFC pilots implemented in Finland, France, Italy, the Netherlands, Norway, and the UK. The research is focused specifically on NFC technology not extending to any other technology.

### Analysis of Related Studies

Analysis of academic literature and previous works helped to identify several main categories of factors negatively affecting further commercialization of NFC services. They can be classified into several groups: macro-environmental factors, micro-level factors, and individual factors (Arvidsson, 2013). They are briefly overviewed below:

**Macro-environmental factors** are related to different aspects of the external environment. Indeed, NFC ecosystems operate in the macro-environment influenced by different political, economic, socio-cultural and technological forces. Threats existing in the external environment as well as changes of external conditions could become external barriers for further development and commercialization of NFC

pilots. Examples are unsteady legislation, changes in consumer protection regulations, financial crisis, changes in behavioral patterns of customers or development of a new advanced technology.

**Micro-level factors** address such questions as company's strategy, business models, relationships with partners and clients, and other related issues. The most critical micro-level factors are:

- a. Cooperation issues resulting in tension about dominant position in the ecosystem, competition between parties and inability to share roles and responsibilities, to agree on "ownership" of consumers, and so on (Bengtsson and Wincent, 2010; Ozcan and Santos, in press).
- b. Business model issues leading to inability of parties to negotiate revenue streams, branding strategy, risks sharing, and so on (Ozcan and Santos, in press).

**Individual factors** are related to consumers and comprise such individual characteristics as behaviour, habits, opinions, etc. The most significant individual factors are:

- a. Behavioral and psychological barriers caused by the general complexity of the service (Boer and Boer, 2009; Constantiou and Knutsen, 2006; Mallat, 2007).
- a. Perceived security risks related to mobile payment (Constantiou and Knutsen, 2006; Mallat, 2007).
- a. Perceived value of the NFC mobile payment remains unclear in comparison to other types of popular mobile and electronic payments (Hayashi, 2012).
- a. Service switching costs experienced due to a change of one payment method to another (Klemperer, 1995).

These identified factors were used as an analysis framework within the research.

## Methodology

The qualitative method, comparative analysis and the multiple case study approach were used in order to reveal the main factors negatively affecting further commercialization of NFC based mobile services. Six NFC pilots implemented in Finland, France, Italy, the Netherlands, Norway, and the UK were analyzed and compared using specified analysis framework.

Both secondary and primary information were used. The secondary information was used as a background for preparation for interview execution. The primary information was gathered through in-depth personal interviews with executives and top-level managers representing companies participating in the selected NFC pilots. Overall 11 interviews were executed, the duration of the interviews was distributed in the range from half an hour to one hour.

## Research Findings

According to the research results the role of the **macro-environmental factors** cannot be underestimated:

- One of the main challenges is a lack of uniform international or national technical service standards and specifications. The cases implemented earlier were affected the most, but this remains a problem today.
- A lack of globally agreed upon the business model is another critical threat affecting ability of parties to negotiate business model questions.
- Another important factor is a lacking legislation and regulation on mobile payment. Existing norms requiring license for provision of payment services set high entrance barriers for new actors entering the market, so, they either need to partner with banks or to look for alternative solutions, such as vouchers or prepaid accounts.



- Economic situation and economic crisis of 2008–2009 became a reason to withdraw one on analyzed pilots because during crises innovative solutions lose their priority.
- There is a strong competition from the side of other payment solutions in Western Europe due to a developed bank infrastructure, popularity of credit cards and other types of mobile and electronic payment, such as SMS, different mobile payment applications, PayPal, and others.

The **micro-level factors** represent another critical set of factors affecting further commercial deployment of the NFC mobile services:

- Significance of the cooperation issues were highlighted by the experience of two analyzed NFC pilots. Inability of partners to cooperate became a real barrier for further service commercialization.
- Completed research could not specify essential business model issues because during the pilot stage parties prioritized development of the technical NFC solution, tested its functionality, and acceptance by users.

Some of the **individual factors** proved to be critical for further NFC service deployment:

- Behavioral and psychological barriers were noticed from the side of the elderly people with little previous experience of interaction with mobile devices. Additionally, consumers are not willing to change the model of their smartphones and compromise just to gain NFC payment functionality.
- The executed research proved that the perceived security risks expressed by consumers are important factors for NFC mobile payment acceptance.
- Due to the fact that consumers in Western Europe have a wide range of payment options, unclear perceived value of the NFC mobile payment remains a challenge. In order to overcome it, additional value of NFC should be promoted.
- Service switching costs were not an issue in the analyzed cases because consumers were not experiencing any additional costs during pilots. Moreover, in some cases, consumers were getting additional incentives for participation in the trials.

Most of the analyzed obstacles and barriers are general for the most types of mobile payments, for example, lack of commonly acceptable business model, lack of legislation in the area of mobile payments, general economic factors, competition between different payment solutions, and cooperation and business model issues within a network of partners. However, there are some factors that are specifically related to NFC services. They are lacking international and national technology standards, unclear perceived value of NFC payments, and perceived security risks.

In summary, the research highlighted the main barriers for further commercial deployment of NFC pilots. The research results revealed complexity of the problem, which will be presented and discussed in-depth in the paper.

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## TRENDS TOWARDS FRAGMENTATION OF THE MOBILE PAYMENT MARKET IN SWEDEN

Jan Markendahl; Wireless@KTH, Royal Institute of Technology

### Introduction

Many new technical solutions for mobile payment service are proposed, developed and tested by Swedish companies. New solutions are developed by companies like Accumulate, iZettle, Payair, PayEx and Seamless and many pilot projects and tests for mobile payments have been conducted in coffee shops, restaurants and shops (Markendahl, 2011). The Mobile operators have formed a company offering mobile payment services (WyWallet). In addition, Swedbank and other Swedish banks have developed mobile phone solutions for payments in shops (Bart) and for transactions between bank accounts of private persons (Swish). Hence, Sweden is an interesting country for research on mobile payment solutions and services. However, we can see a clear trend of fragmentation of services and no emerging “common solution”.

- For person to person (P2P) payments both Swish and Wywallet can be used and with a smart phone you can access the internet bank form your mobile phone. In addition, the SEQR solution from Seamless addresses P2P transactions.
- For retailing and PoS payments using the mobile phone the retail chain Axfood in parallel run pilot projects with both Swedbank (Bart) and Seamless, in addition Wywallet plan to introduce PoS payments
- Until now SMS ticket solutions for public transport have been provided by mobile operators and mobile service providers like SMS aggregators and ticket providers. However, the business landscape in Sweden has changed since new actors and constellations have entered the market.
- For parking tickets and payments there exists a multitude of different solutions where the mobile phone is used. This include SMS ticket, parking subscriptions and the use of special parking apps, see figure illustrating this multitude.



Figure 1. Multiple payment solutions are possible for parking tickets

When it comes to the transformation of the SMS ticket market a number of reasons or drivers for this can be identified for this change (Markendahl, 2011).

*The Payment Services Directive (PSD)*<sup>6</sup>; financial regulation states that payment providers need to know how is doing the payments and transaction, one reason for this is to stop “money laundry”. This means that mobile operators need to register subscribers with pre-paid subscriptions. This was used as an intermediate solution by the operators Tele2 and Telenor that applied to be payment providers.

*Bill chock and business phone users*; mobile operators noticed that the possibility to use the mobile phone bill to pay other non-telecom expenses was not entirely positive. Some consumers reacted on high phone bills which included items like bus tickets, TV votes, candy and soft drinks from vending machines and they experienced a bill chock. In addition, persons with company phone subscriptions could not use this form of SMS payments using the phone bill. Operators saw a risk that the phone usage would decrease.

*A need for separate charging solutions* was clearly identified by the mobile operators. As an intermediate solution the Swedish operator Telia introduced a separate charging solutions “Telia Mobile Wallet” provided by Payex, Telia did not want to be payment provider. The Swedish operators later on formed a joint venture 4T Sweden offering the separate charging solution WyWallet.

*Public procurement of public services*; the regional transportation companies are public organizations that need to make official procurements including tender evaluation of competing offers. According to representatives for many regional transportation companies this procurement process may not have been fully identified or understood by the mobile operators and WyWallet. WyWallet also decided not to bid for several of the procurements of SMS ticket and payment solutions, hence other actors like Mobill, IPX, Payex, Samtrafiken, and Seamless made offers and got all contracts except one.

### **Research approach**

Data collection in the form of interviews with different types of actors dealing with mobile payment services and solutions has been ongoing since 2009. The main groups of actors are:

- Service providers making use of mobile payment solutions, typically the regional public transportation companies and parking operators
- Providers of mobile payment and ticketing services including mobile operators, mobile ticket providers, aggregators, financial institutions and payment solution providers
- Providers of technology solutions, examples are Payair, Payex, Accumulate,

A first round of interviews was conducted 2010-2011 in order to understand the market position and plans for different actors, this is reported in (Markendahl, 2011). A second round of interviews was done 2012 in order to understand: i) the objective and scope of different pilot projects and trails, and ii) strategies and plans for both solution providers as well as users of the upcoming “new” SMS payment and ticketing services. In February 2013, after the launch of the “new” SMS tickets for public transportation, interviews were made with public transportation companies in the five major cities/regions of Sweden (SL, Västtrafik, Skånetrafiken, UL and Östgötatrafiken) and with some of the providers of the ticket and payment solutions: Mobill, Samtrafiken, Seamless and WyWallet. For the interaction between market actors and the involved resources and activities basic ideas and the ARA model

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6 <sup>1</sup> [http://ec.europa.eu/internal\\_market/payments/framework/psd\\_en.htm](http://ec.europa.eu/internal_market/payments/framework/psd_en.htm)

(Actors, resources and activities) from business network research are used (Håkansson and Snehota, 1995), (Ford et al, 2007). The ARA model approach has been applied to analysis of local wireless access services (Markendahl & Mäkitalo, 2007) and to mobile payment services (Markendahl, 2011).

### 3 Initial results

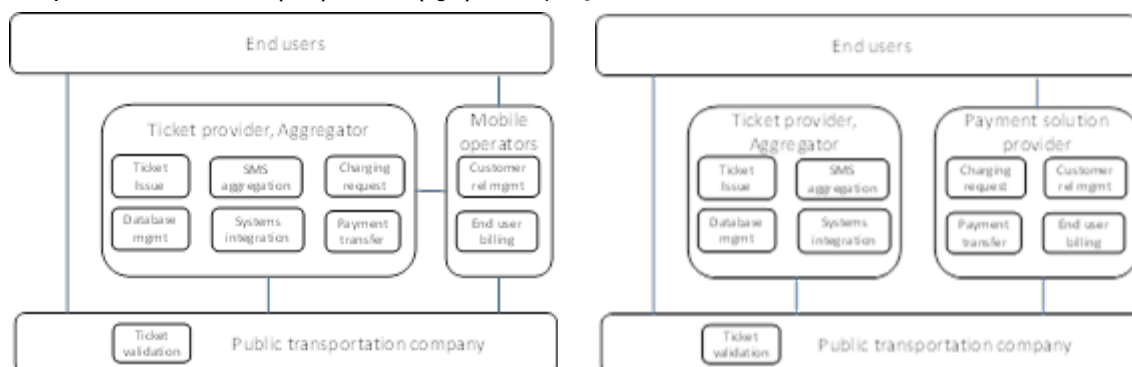
We can see a multitude of payment solutions that may be confusing to the consumers and also merchants and service providers making use of mobile phones services. But there are differences between different sectors, for parking services the parking operators and payment providers have developed solutions that enable all different solutions to be integrated into one ticket validation app.

The SMS payments were initially introduced using the phone bill or prepaid SIM card as a payment solution, the mobile operators were naturally involved. The end-users were subscribers of the mobile operators and this customer and billing relation was exploited. For public transportation companies the distribution of roles typically looked like the one to the left in Figure 2. The ticket handling and SMS aggregation was usually managed by one mobile service provider. Note that the ticket validation is managed by transport company, “ticket control” staff with handsets connected to the ticket data base. Also note that the ticket provider and aggregator in this case not are visible to the end-user.

Table 1. Actors and teams that got the contracts late 2012 for technology and payment solutions for SMS ticket services for regional transportation companies in Sweden.

Regional transportation company	Provider of technology solution	Provider of payment solution
UL, Östgötatrafiken, etc	Mobill	Payex and OKB
Skånetrafiken	Plusdial	WyWallet
Västtrafik	IPX + Plusdial	Seamless
SL/Stockholm) (got the contract)	Unwire	Samtrafiken, DIBS
SL (temporary solution)	Mobill	Payex and OKB

Figure 2. Typical distribution of activities and resources among actors for provisioning of SMS tickets for public transportation in Sweden; until (left: ) and after (right) February 2013



After February 1 2013, the “traditional” SMS payment solution involving end-user charging through the mobile operators is longer used. The public transportation companies have made a procurement of “new” SMS payment solutions. In most cases it is two different contracts, one for the technology solutions (i.e. handling the SMSes and the SMS tickets) and for the payment solution. For other appli-

cations than local transportation (vending machines, airport couches, fundraising, etc.) the operator owned joint venture WyWallet has taken over the SMS payment contracts. The analysis of all new cases results in a generic map shown in the right part of Figure 2. There is a clear separation between the actors managing the technology solution and the payment solution. The mobile operators are no longer involved and the mobile phone bill cannot be used. Many new actors have entered the market for SMS payments, see table 1.

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## THE CASHLESS SOCIETY – INDUSTRIAL DYNAMICS INFLUENCING CASH-BASED PAYMENT SERVICES

**Niklas Arvidsson, Associate Professor in Industrial Dynamics Royal Institute of Technology**

### **Background**

There is a concern about costs of different payment services in our societies which, in combination with new technologies and entrepreneurial innovation, has led to an increasing political and entrepreneurial interest in changing the payment system. From a political side, studies show that the economic benefits for a society if cash is replaced by electronic payments may be around or even more than 0.3 percent of GDP annually (Segendorf & Jansson, 2012; Danmarks Nationalbank, 2011). From the entrepreneurial side, there are innovations that may become substitutes for cash payments currently being launched in the payment systems (Arvidsson, 2013). Given this, the article asks how processes of industrial dynamics may change the landscape for cash based payments.

### **Purpose**

The purpose of this study is to create a better understanding of what is likely to characterize Sweden if the payment system is cashless, and which factors and actors most likely to influence a transition towards a cashless society. The study does not argue that the society should become cashless but rests on the idea of a cashless society as a hypothetical state.

### **Theory – growth and renewal in innovation systems**

The theoretical basis for this study is based on theories on innovation systems and innovation dynamics. Research on dynamics in innovation systems has concluded there are factors conserving a system as well as factors changing the system where dynamic processes are shaped by the interaction between these two types of factors. These discussions include sociology and institutional factors (Geels, 2004), technologies (Bergek et al, 2007), and technological- and business ideas (Arvidsson & Mannervik, 2009), but also specific technological fields such as renewable energy (Johnson & Jacobsson, 2001). The frameworks are built on parallel processes either making the current system functioning in a more efficient manner or changing it in a more radical way (Schumpeter, 1934; March, 1991; Geels, 2004; Bergek et al, 2007; Arvidsson & Mannervik, 2009). This framework suggests that the cash-based payment system will be affected by parallel forces where some lead to increased efficiency and others lead to radical innovation (Henderson & Clark, 1990), but also that interaction between these two determine if there will be a cashless society.

### **The methodological framework**

The article also have a secondary aim of applying and testing the general methodological and analytical framework for analyzing functional dynamics of technological innovation systems proposed by Bergek et al (2008). The proposed methodological framework is aiming at analyzing technological innovation systems that are defined as socio-technical systems focused on the development, diffusion and use of a particular technology (Bergek et al, 2007) with the help a more coherent methodological approach to studies of innovation systems (Bergek et al, 2008: 408). I aim to contribute to this ambition by applying the framework to a technological innovation system – cash-based payments – that has not previously been studied using theories and methodologies connected to innovation systems.

### **Data collection**

The study is based on a literature review, interviews and interactive meetings where participants discussed findings from the literature and interviews. The study covers 24 interviews covering banks,



retailers, mobile operators, service and infrastructure providers, card companies, trade unions, Sveriges Riksbank and the authorities attached to the payment system. The study also ran three meetings where each consisted of a half-day 3 meeting with 6-13 participants. We believe this method ensures both high reliability and high validity.

### **The first step: cash-based payments**

The study focuses on cash-based payments which constitute a subset of mass payments, i.e. payments that occur in large numbers but where the amount per transaction is relatively small (Sveriges Riksbank, 2012: 116). Such payments are low-value transactions and can be used in payment situations where there are clear substitutes (e.g. proximity payments in stores) as well as in situations when there are no strong alternatives (e.g. person-to-person payments done in real time).

### **The second step: identifying structural components**

The task of identifying the central structural components – actors, networks and institutions – builds on ANT-theory (Law & Hassard, 1999). Actors are identified via a report from Sveriges Riksbank (2011). This report outlines the following actors in the system for cash handling The Central bank (Sveriges Riksbank), commercial banks, depot services by Bankernas Depå AB (BDB), providers of automated cash handling services, cash handling service providers, and receivers of cash payments like merchants and other payees.

### **The third step: describing vital functions in the system**

This step is in this study actually a result from the starting point, i.e. the hypothetical idea of a cashless society. Based on literature studies, interviews and workshops the study provides an image of critical characteristics of a cashless society, which is summarized in table 1.

**Table 1. Critical characteristics of a cashless society Infrastructure that is tailored to digital payments.**

Consumers are willing to pay for mobility services
There is the same type of trust in digital money as there is in paper-based money today.
New players that offer mobile payment services have not made big mistakes during the launches.
Merchant and consumer fees for electronic payments are reasonable.
Employees in merchant and trade firms are skilled in using new types of payment services
Banks and shops have a higher physical security for its employees but face a larger risk of electronic crimes
There are electronic real-time payments or transfers that are similar to cash payments.
There exists a diversified range of payment services and there are more types of service providers than today.
The state has higher tax revenues, and the tax system has become more transparent and fair.
There is no lack of technical solutions that mobile payment services may use.
The European clearing and settlement industries have become more integrated and consolidated.
Reduction of fees for small electronic payments (by card or by your mobile phone) helps reducing cash usage by consumers.
Added-value services linked to mobile phones and mobile payment services have stimulated an increasing interest in reduction of cash usage by merchants.

New fees for cash-based payment services have led to a reduction in cash payments.
There is a clear and transparent system for fees and interest on cash in circulation that stimulates reduced use of cash.
Many different companies have created common platforms for mobile payments.
Aggressive competition from new entrants (such as PayPal or Google) has accelerated the development and investment in infrastructure for a cashless society.
The use of cash has been reduced to the point that the costs of continuing with cash become a deterrent to banks, merchants and consumers. This in turn has stimulated politicians to act.
The new notes and coins in Sweden have not been adopted at the pace that many thought.
Swedish and European-based politicians have actively pursued both opinion related debate as well as outright political decision-making aiming to transfer the society towards a cashless economy.

#### The fourth step: assess how well these functions are fulfilled

The list below can therefore be seen as a list of indications of areas where the current system does not fulfill critical functions if the society is to become cashless. The list of functions not fulfilled is:

- Preparedness for crisis
- Trust-based everyday payments
- Business system
- Transparent and fair laws, regulation and public authorities
- Active banks and other financial institutions
- Active merchants
- Improved employees and workplace health and safety
- Value for consumers
- Focus of providers of infrastructure and services

#### The fifth step: identifying mechanisms that influence development

The study identified a number of mechanisms in the literature study and in interviews which then were discussed in the workshop meetings. The results are summarized below.

Table 2. Factors stabilizing the system and factors stimulating change of the system.

Factors stabilizing the system	Factors stimulating change of the system
The lack of a clear business model for mobile payments.	The digitalization of the payment system drives ambitions to create a shared infrastructure.
Consumer habits are slow to change.	Increasing demand for new mobile payment solutions.
Politicians in Sweden are not pushing the question of cash.	EU's work (like the Payment Service Directive) as well as banks' initiatives for self-regulation (SEPA) encourage increased use of card payments.
Fees for card payments are experienced as being high.	Young people embrace new technologies.

Factors stabilizing the system	Factors stimulating change of the system
Inadequate security around mobile phones and low confidence in mobile payments by consumers.	Increases in e-commerce.
Consumers' perception that access to cash-based payments without fees is a human "right".	Cash service surcharge
Cash payments enable a privacy and integrity protection.	A convincing communication and information campaign about what a reduction of cash implies.
Many actors runs their business on the existence of cash.	Armed robberies and work life issues in connection with cash makes cash less attractive.
There are many payers as well as payment situations that see cash as the only possible means of payment.	Several technologies for electronic payments that may substitute cash exist — this is not a critical factor.
	The Zeitgeist stimulates interaction via electronic media.
	Increased awareness of the high costs to society of cash.
	Tax authorities' ambitions to make taxation and control of cash-based industries more effective.
	Card usage increases and new payment services that are direct substitutes to cash payments are established.

### **The last step: policy issues related to inducement and blocking mechanisms.**

This step is tentative and needs further work but some important policy issues that has been identified are:

- Develop a payment system that is robust and can withstand crisis in the form of power breakdown, hacker attacks and other types of problems that makes payments impossible. This encompasses the creation of electronic payment services that can substitute cash-based payments in areas where these are strong today.
- Ensure a level playing field for competitors in the field of payment services. This involves understanding competition and anti-trust issues also when new actors from other industries than the financial industry enters the scene.
- Actively work to stimulate a growth of an innovation system for payments.
- Make sure consumers are prepared to a fundamental change in the payment system. This includes educating those who use a lot of cash today as well as educating consumers to become good customers in a changed business environment for payments.

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## PAYMENT RESEARCH: A LITERATURE REVIEW

Jonas Hedman, Xiao Xiao and Emma Svensson

Department of IT Management, Copenhagen Business School, Denmark

### Introduction

For most part of the 1900s, cash and checks were the most common options available for purchases and financial transactions between individuals and companies (Evans & Schmalensee, 2005). During the second half of 1900s, the payment card (i.e., debit or credit) was made available for store purchases and later used to withdraw cash from Automatic Teller Machines (ATMs) (D. Garcia-Swartz, R. Hahn, & A. Layne-Farrar, 2006). In the 1990s, electronic commerce (e-commerce) appeared as an alternative way of conducting financial transactions over the Internet. Internet payments and internet banks emerged (Zwass, 1996) including DigiCash and PayPal.

New payment services emerge, utilizing the new technologies sparked innovation in payments. For instance, companies like PayPal offer a solution to make payments over the Internet. iZettle and Square provide dongles that convert smart phones and tablets into card terminals. Netswipe uses the webcam to conduct card payments. Google provides an app that uses NFC technology to replace the physical payment cards with a digital payment card. Finally, Bitcoins provides a virtual currency. These innovations and many others provide individuals and companies with opportunities to pay in ways that were not possible before.

Payment is not a research discipline in itself, but the topic appears within several domains, including information systems (Mallat, 2007), consumer behavior (Raghubir, 2006), marketing (Raghubir & Corfman, 1999), economics (D. Garcia-Swartz et al., 2006), sociology (Knights, Noble, Vurdubakis, & Willmott, 2007), and banking and finance (Kahn & Roberds, 2009). This has ensured a broad coverage of payment topics ranging from adoption of mobile payments (Mallat, 2007), cost-benefit analysis of cash and payment cards (Swartz, Hahn, Layne-Farrar, & Studies, 2004), social implication of internet banking (Linné, 2008), to spending behavior (Raghubir, 2006). There have been several attempts to review the available literature (e.g. Dahlberg, Mallat, Ondrus, & Zmijewska, 2008; Raghubir, 2006) to summarize the advancements in research, which contribute greatly to the progress of each discipline. Given the fact that payments span multiple disciplines, the existing reviews lack inter-disciplinarity and this hampers our understanding of payments. Hence, the purpose of this paper is to integrate different streams of research into one review.

The remainder of the paper is structured as follows. In the next section, we introduce briefly and explain the different forms of payments. This is followed by the presentation of the literature review, which is structured around three themes: including payments and spending, intentions to adopt mobile payments, and consequences of payments for society. The paper concludes with a discussion of the findings.

### Payments

Payments and money are a part of everyday life. A broad definition of payments would include the choice of payment instrument, the transfer of money, as well as the consequences of this process. A more restrict definition of payments is the process of transferring money or funds from payer to payee. In most cases, there are one or several middlemen, such as banks and payment card houses, who transfer the money between accounts. Payments are often seen as a fulfillment of a contract between two parties and occur before, during or after the transfer of rights to goods and services. Today, most

payments are non-cash, such as credit transfer, direct debits, and payment cards with an increase of e-money payment schemes, such as PayPal and SMS payments (Danmarks-Nationalbank, 2005; Kokkola, 2010).

Payments are based upon instruments that include a set of procedures enabling the transfer of money from the payer to the payee. In everyday language payment instruments are referred to as payment channels or payment methods. There are many payment instruments and they can be divided into cash and non-cash. Cash payments are exchange-based and involve the use of banknotes and coins. They are often exchanged face-to-face, anonymously, and can be considered final.

Non-cash payment instruments involve the transfers of money between accounts that are mediated by third parties. This type of payment is referred to as provision-based payments. The payer or payee gives instructions to the bank, either to transfer or collect money from one account, and move it to another account. The most frequently used non-cash payments in the world are payment cards, credit transfers, and direct debits. Other forms include retail cards and e-money (Danmarks-Nationalbank, 2005; Kokkola, 2010).

### **Payment research**

In reviewing the available literature on payment, a number of themes and topics have emerged, including technology (Cowen, 2009), consumers and merchant adoption (Mallat, 2007; Mallat & Tuunainen, 2005), impact of payment instruments (Jonker, 2007), legal and regulatory issues (David B, 2004; Lin & Chang, 2007), privacy and security (Asokan, Janson, Steiner, & Waidner, 2000), and cost benefits of payment systems (D. D. Garcia-Swartz, R. W. Hahn, & A. Layne-Farrar, 2006; Singh, 1999). Table 1. presents a summary of review. We structure the review according to the following topics: (1) payments and spending behavior; (2) intention to adopt; and (3) consequences of payment systems.

Table 1. Summary of review

Citation	Focal Area	Discipline	Payment Instrument	Theory	Level of Analysis	Methodology	Independent variable	Mediating variable	Depended variable
Raghubir 1998	Use and Impact	Consumer research	Coupon	n/a	Individual	Experiment	Value of discount coupons	Availability of alternative information	Perceived Price
Raghubir and Srivastava 2009	Use and Impact	Consumer research	Cash	Self-control and Denomination effect	Individual	Experiment	Size of denominations	People's desire to reduce the pain associated with spending	Choice of denomination; Amount of spending
Raghubir and Srivastava 2002	Use and Impact	Consumer research	Foreign currencies	Money illusion	Individual	Experiment	Face value of foreign currencies; exchange rate to home currency	Time pressure Experience	Amount of spending
Raghubir and Srivastava 2008	Use and Impact	Consumer research	Credit Card Cash Gift Certificates	Transparency of payment	Individual	Experiment	Payment coupling	Payment form	Amount of spending
Hafalir and Loewenstein 2009	Use and Impact	Consumer research	Credit Card Cash	n/a	Individual	Field experiment	Payment instrument		Amount of spending
Prelec and Simester 2001	Use and Impact	Consumer research	Credit Card Cash	Transparency of payment	Individual	Experiment	Payment instrument		Amount of spending
Soman 2001	Use and Impact	Consumer research	Credit card Cheque		Individual	Experiment	Payment instrument	Rehearsal Immediacy	Intention to purchase

Citation	Focal Area	Discipline	Payment Instrument	Theory	Level of Analysis	Methodology	Independent variable	Mediating variable	Dependent variable
Soman 2003	Use and Impact	Consumer research	Pre-paid cards, Credit Card	Transparency of payment	Individual	Quasi-field experiment	Payment instrument		Amount of spending; Separating laundry
Ng and Yip 2010	Intention	Consumer research	Mobile payments	Prospect Theory	Individual	Survey + Interviews + focus groups	Type of product (product surplus)		Willingness to pay for inter-mediating payment service
Chatterjee and Rose 2012	Use and Impact	Information Systems	Cash Credit cards	Payment coupling	Individual	Experiment	Type of payment		Perceived value of product (benefits versus costs)
Holmstrom and Stalder 2001	Adoption	Information Systems	Electronic cash	Technology drift and actor-network theory	Mixed	Case study	Lack of drift (from a single purpose network to a multi-purpose network) and lack of flexibility led to the failure of the introduction of electronic cash.		
Mallat and Tuunainen 2005	Adoption	Information Systems	Mobile payment system (by merchant)	n/a	Group	Interview + Survey	Prerequisites Barriers Drivers		Merchants' adoption intention
Zhou et al. 2010	Adoption	Information Systems	Mobile banking	TTF and UTAUT	Individual	Survey	Task technology fit; Performance expectation; effort expectation; social influence; facilitating conditions		User adoption intention



Citation	Focal Area	Discipline	Payment Instrument	Theory	Level of Analysis	Methodology	Independent variable	Mediating variable	Depended variable
Plouffe et al. 2001	Adoption	Information Systems	e-Payment system	Diffusion of innovation	Group	Survey	Relative advantage; compatibility; trial-ability; ease-of-use; visibility; result demonstrability; image; voluntariness		Intention to adopt
Ondrus and Pigneur 2007	Adoption and diffusion, Context	Information Systems	Mobile payments	n/a	Industry	Interviews	Card-based systems remain preferred, mobile payments are seen as a natural evolution. No institutions were identified as major actors in the development of mobile payment solutions		
Humphrey 2004	Use	Finance	Check, Cash, Credit, Debit	n/a	Individual	Econometric modeling	Estimate the cash use in US over the past 2 years...		
Humphrey et al. 2000	Adoption; Context	Finance	E-payment	n/a	Societal (US)	Econometric modeling	Consumer side barrier: lack of price incentives. Supply side barrier: legal restriction, cost, view of cannibalization		
Mattat et al. 2009	Adoption and Acceptance	Information Systems	Mobile ticketing	Diffusion of innovations	Individual	Survey	EoU, PU, Compatibility, Mobility	User context	Use Intention

Citation	Focal Area	Discipline	Payment Instrument	Theory	Level of Analysis	Methodology	Independent variable	Mediating variable	Depended variable
Ordrus and Pigneur 2006	Adoption/Context	Information Systems	Mobile payments	n/a	Market	Mixed	Holistic analysis of the market of mobile payments.		
Khiaon-arong 2000	Context. Payment system	Information Systems	e-Payment	n/a	Societal (Thailand)	Case Study	The case of the reform of rudimentary payment systems in the context of emerging economies. Three issues related to the process: legal issues, liquidity, float...		
Rochet and Wright 2010	Use/Context	Finance	Credit card	n/a	Group	Econometric modeling	Inter-charge fee		Consumer surplus

### ***Use and Impact***

The first theme is how payment instruments affect human behavior. This research is explored within marketing and consumer research and is primarily interested in how different payment instruments, such as credit cards, gift certificates, pre-paid cards, and cash (the latter also in different denominations and currencies), affect spending behaviors (e.g. Chatterjee & Rose, 2012; Simester and Prelec, 2001; Soman, 2001, 2003; Hafalir and Loewenstein, 2009; Raghurir, 1998, 2005, 2006; Raghurir, 2006; Raghurir & Celly, 2011; Raghurir & Corfman, 1999; Raghurir & Srivastava, 2002, 2008, 2009; Raghurir & Srivastava, 2008; Raghurir & Srivastava, 2009; Srivastava & Raghurir, 2002).

This research has its starting point in Monroe's (1973) article on the subjectivity of price. This is that people value prices and money (payment instrument) differently based on their individual differences, price presentation, form of money, and consumer context characteristics (Raghurir, 2006). These findings lead to a number of studies explaining subjectivity in different ways. Raghurir (2006) reviewed this body of literature and payment instrument biases can be discussed along 1) perception (biases in assessing the value, due to e.g. the familiarity of the payment mode), 2) inferences (to the extent and how consumers use information in decision situations), 3) affect (how feelings and emotions influence spending), and 4) memory (e.g. failure in remembering certain transactions).

One study that shows the effect of payment instruments on behavior is provided by Raghurir's (1998) who study how consumers use discount coupons (10% vs 20%) as a signal of the price of a product. The higher discount value - the higher price. The form of payment instrument (coupon) affects the perception of the price. Related to this is the concept of transparency (vividness) in payment instrument. This is if the payer can feel the outflow of money. Raghurir and Srivastava (2008) explored the difference in transparency in different payment instruments and draw upon Prelec and Loewenstein (1998)'s idea of payment coupling, which suggests that there is an immediate pain of paying with cash, whereas other forms of payment instruments (e.g., payment card or gift card) are less transparent and therefore not associated with the same level of pain. Four studies investigate differences in spending behavior as a function of payment instrument: whether less transparent payment instruments are associated with more spending. Study 1 explores the willingness to spend if a payment card logo is present or not. Study 2 finds that the payment card effect can be sensitive to decomposing the cost of a basket of goods. Studies 3 and 4 study differences in behavior when the payment instrument differ only in form (i.e. there is no temporal effect) and find that consumers spend more/are more likely to spend more when the same amount of money is given in the form of a gift certificate than when is given in the form of cash.

The differences in transparency that give rise to different degrees of pain of paying and thus differences in spending have also been documented by Soman (2001, 2003). In particular, Soman (2001) tests in two quasi-field experiments whether pre-paid cards increase spending (photo-copying cards and laundry cards) and find that using these cards increase spending compared to using cash. Soman (2001, 2003) further finds support for a credit card spending effect using both hypothetical scenarios and consumer transaction data (receipts). In a similar vein, Prelec and Simester (2001) conduct an incentivized experimental auction where one group instructed to pay with cash and the other to pay by credit card. While they find that credit cards give rise to higher bids compared to cash when people bid for sports tickets, they fail to find a significant difference when people bid for a certificate with a known value. The differing result between the two experiments may be due to a number of reasons apart from the product such as anchoring on credit card numbers and different types of auctions. However, Hafalir and Loewenstein (2009) find, using a field experiment conducted during lunch hours in a cafeteria at an insurance company, that only people who do not carry credit card debt spend more using credit

card while those that carry debt spend less, which suggests that people learn from past experiences. It is worth noting that Hafalir and Loewenstein use a conservative test and that the comparison between cash and credit card yield significant differences in spending. They suggest that this shows that differences between credit card and cash users are likely to be important when investigating payment instruments and spending.

In further study by Raghbir and Srivastava (2009), the authors draw on the theory of “self-control” to investigate the “denomination effect” which states that consumers are likely to spend less when using one large denomination (e.g., one 100 Dkr bill) relative to many smaller denominations (e.g., five 20 Dkr coins). The explanation is that low denominations are less psychologically stressful, since this is a strategic device to control and regulate spending. The authors carried out three studies: in the first study they examined the denomination effect (four quarters versus \$1 bill) in actual purchase decisions as opposed to purchase intentions, which most mobile payment studies are based upon, and found that participants were less likely to spend when they were given a large denomination relative to when they were given an identical amount in small denominations; the second study showed that people prefer to receive money in a large denomination rather than several small denominations; study 3 found that individual difference in the anticipatory pain of paying moderates the denomination effect.

Another theoretical concept that has been applied in this stream of research is “money illusion” by Shafir et al. (1997) who suggested that “people think predominantly in terms of nominal rather than real value” (Raghbir and Srivastava 2002; p. 336). Along this line, Raghbir and Srivastava (2002) investigated how foreign currencies impact people’s spending behavior and found that people evaluate products that are priced in an unfamiliar foreign currency based on their nominal value (face value). The results of their experiments showed that paying in an unfamiliar foreign currency which is worth a multiple of the home currency leads to under spending while paying in an unfamiliar foreign currency which is worth a fraction of the home currency leads to overspending.

The contribution of this body of research is that it expands our understanding of consumer behavior, using established theories in psychology and consumer research, which is broader than the traditional economic man. These studies are based on empirical research of how people behave (e.g. consumer transaction data, experiments in laboratory and field settings) and provide ideas on how payment instruments may be designed. For instance, a consumer who wants to minimize her spending should carry large banknotes and not use non-cash payment instruments. One important lesson is that, in contradictory to some economic theory, the type (cash versus payments) and form (denomination effect) of payment instrument affect how we spend money. Based on this one could speculate that digitalization of payment instrument will lead to increase in spending. There are of course limitations in this research. First, most of the empirical studies use hypothetical or relative small incentives, e.g. \$ 1. Self-selection poses another methodological constraint present in some of the studies. Secondly, there is still a lack of research that investigates how new advancements in technology, such as mobile payments, affect spending behavior.

### ***Intention and Adoption***

The second theme is adoption of new payment technologies. IS researchers have been engaged in this stream of research, and they are especially concerned about mobile payments.

The mobile phone is well positioned for making payments due to its high penetration level. Over the years the phone has evolved from a calling and text sending technology to be a small portable computer. Today one can use a mobile phone to carry out any type of payment as well as mobile payments.

There are two types of mobile payments. The first type involves payments that utilize the mobile network, such as PayPal Mobile and SMS payments, to initiate and authorize a transaction. The other is contactless payments systems, based e.g. NFC or QR codes, to initiate payment by placing the phone in close proximity to a reader in a merchant's POS terminal.

Mobile phone payment research started with the e-commerce adoption in the 1990s (Asokan et al., 2000; Zwass, 1996) and began with a survey of technologies needed for mobile payments in 1999 (Peirce & O'Mahony, 1999). The technology focused research has in particular focused on the adoption of mobile payments (Ally & Toleman, 2004; Bolt, Humphrey, & Uittenbogaard, 2008; Cortignani & Severini, 2011; Crowe, Rysman, & Stavins, 2010; Dan & Jing, 2011; de Meijer & Bye, 2011; Grilli, Guastaroba, & Taroni, 2007; D. B. Humphrey, Pulley, & Vesala, 2000; Keramati, Hadjiha, Saremi, & Lee, 2008; Khanna, Isik, & Zilberman, 2002; Mallat, 2007; Mallat & Tuunainen, 2005; Nisbet, 2009; Plouffe, Hurland, & Vandebosch, 2001; Plouffe, Vandebosch, & Hurland, 2001; Saji, 2008; van der Horst, 2011; Zhang, 2009) and is much more driven by technological innovation than theoretical advancements like marketing and consumer research is.

One of the popular theories that were drawn up by this stream of research is Diffusion of Innovation Theory (DOI). DOI (Rogers, 1995) explains adoption by five innovation characteristics: relative advantage, complexity, compatibility, trialability, and observability.

For example, Mallat (2007), one of the key papers in mobile payment research, studied consumer adoption, i.e. willingness to use, of mobile payments. Drawing and extending (including network externalities, trust and security, and contextual factors) on DOI, this exploratory study utilized six focus groups as a mean of data collection. He revealed that the relative advantage of mobile payments included the possibility to make payments ubiquitously, independence of time and place, and the possibility to avoid queues. 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. Mobile payments are compatible with small value payments and could be beneficial in four areas: (1) electronic ticketing; (2) mobile content and services; (3) purchases on vending machines; and (4) small value payments. Mallat (2007) also explored the barriers to the adoption of mobile payment: the complexity of mobile payment services (e.g., the use of SMS with various payment codes and premium service numbers that is difficult to remember); premium pricing; perceived risks and trust in mobile payment service. Furthermore, he suggested that the use context is important, such as presence of queues, lack of alternative payment methods, urgency, and unanticipated need.

A similar study also based on Diffusion of Innovation Theory investigated merchant adoption and found that the main adoption drivers are related to the means of increasing sales or reducing the costs of payment processing. The barriers to adoption include complexity of the systems, unfavorable revenue sharing models, lack of critical mass, and lack of standardization (Mallat & Tuunainen, 2008).

Technology Acceptance Model (TAM) has also been used extensively when studying mobile payments. TAM (Davis, 1985) models how users (payers or payees) accept a technology through a number of factors, but the core concepts relate to Perceived Usefulness and Perceived Ease of Use. Perceived Usefulness is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" and the Perceived Ease of Use is defined as "the degree to which a person believes that using a particular system would be free from effort" (Davis, Bagozzi, & Warshaw, 1989).

For example, Kim et al. (2010) proposed an m-payment research model consisting of two user-centric factors (personal innovativeness and m-payment knowledge) and four m-payment system characteristics (mobility, reachability, compatibility, and convenience). Similar is the results of Chen (2008)'s study of adoption of mobile payments, in which they utilized both TAM and DOI. Support of Chen's model was found in data collected from a survey of 299 potential m-payment users. Another study by Plouffe et al. (2001) also applied TAM, but they extended it to multiple groups and stated that these groups must jointly adopt an innovation in order for it to succeed. Empirically, the article reports findings from a study investigating smart card adoption by consumers (who must decide to use the new card) and retailers (who must agree to adopt and use new technology needed to process smart card transactions). The most important characteristic leading to adoption identified was relative advantage. Compatibility was also important to all. Participating consumers and participating merchants appeared to possess different perspectives when assessing their decision to adopt the smart card technology. Consumers seemed to value the notion that the adoption decision is under their control, whereas merchants seemed to place more value on the antecedents that had the potential to add to their bottom line. This suggests that it is necessary to institute different marketing tactics to attract the early adopting groups.

Another paper by Holmstrom & Stalder (2001) investigated a failed case of the same type of technology. They applied two theories: technology drift and actor-network theory to explore how and why payment cards often need to change, relative to their initial conceptions, during implementation. Some of the findings were: lack of flexibility was identified as an important reason for the card's poor public acceptance; banks ignored the critical comments of merchants, thus refusing to negotiate about the intended role of the technology; the cards were perceived as serving only the needs of the banks, while ignoring the needs of merchants and card users.

Ondrus and Pigneur (2006) present a more holistic approach to understand the role of new payment instruments (card and phone based). The paper tries to use a multiple perspective approach to analyze the mobile payment market. The multi-perspective analyses provide a more complete view of the market. The results of their analyses show that mobile payments are not yet ready to take over the market. However, the potential is there as the different stakeholders already agree that this could be the next big evolution in the payment market. Moreover, the market does not seem to be quite ready to adopt mobile payments en masse. (Ondrus & Pigneur, 2006)

A comprehensive review of the mobile phone payment research can be found in Dahlberg et al. (2008) who summarizes and analyses research on mobile payments from 1999-2006. They reviewed 73 articles on mobile payment research. The review included 16 journal articles and 57 conference articles, whereof 30 included empirical work and 43 where conceptual. The analysis of 73 papers was based on a contingency theoretical framework and identified the following topics: technology, consumers, mobile payment services market and providers, merchant power, legal and regulatory and standards, and new payments. Some of their findings were: research on the commercial environment and the social and cultural environment is critically needed; there should be a strong focus on the technological environment with a particular emphasis on mobile payment systems; and major issues regarding legal, regulatory, and standardization environment remain.

Limitation in this stream of research is related to data collection – mainly utilizing perceptual measures. Another issue is the time lag between new invention and published research. One example is that we can see how the mobile phone can be converted to a personal payment card terminal and point of sales systems (see for instance Square, [www.squareup.com](http://www.squareup.com), or iZettle, [www.izettle.com](http://www.izettle.com)).

### ***Payment Systems and Macro-level Consequences***

Payment instruments have cost and benefits for society. Economics and also banking and finance researchers explore this (Baker & Jimerson, 1992; Baxley & Hergenroeder, 2008; Berger, Hancock, & Marquardt, 1996; D. Birch, 2008; D. G. W. Birch, 2007; Chmielarz & Nowak, 2010; Cagnet, 2010; David B, 2004, 2010; Flatraaker, 2009; D. Garcia-Swartz et al., 2006; D. D. Garcia-Swartz et al., 2006; Hofstad, 2010; D. B. Humphrey et al., 2000; Kahn & Roberds, 2009; Zinman, 2009). The general conclusion is that more research is needed. In particular in the area of how and why people choose payment instruments (D.B. Humphrey, 2010). The outset of this research is the dramatic changes that have occurred in the payment system over the past two decades, in particular the explosion in payment cards (Borzekowski & Kiser, 2008) and new forms of payments. This has led to a series of studies on how consumers choose payment instruments.

One interesting study is Borzekowski & Kiser (2008) study of changes in the US payment market. They used nationally representative survey, with open-ended questions to rank and estimate consumer substitution among payment instruments. They conducted supply-driven and demand-driven counterfactual experiments in order to estimate market share and cost effects. An interesting finding is that contactless debit will take market share from cash, checks, and credit (Borzekowski & Kiser, 2008).

Consumers are price sensitive, in particular of a credit card charge. Additional results suggesting that debit is becoming a stronger substitute for credit over time have implications for theory, optimal regulation of payment card networks, and business strategy (Zinman, 2009). This was the theme of Norges Bank payment conference in 2008. Four papers from the conference presented empirical analyses of this. Historically, most of the literature on payment choice correlates consumer socio-economic information with payment instrument adoption since this has been the data that are available. Schuh and Stavins (2010) extended this in a new and nationally representative survey for the US, by including payment fees and non-price payment characteristics (convenience, safety, privacy, etc.). The authors found that payment characteristics (including fees) have a greater significant influence on instrument use than demographic and income information. Among the seven payment characteristics, fees and convenience were most often the significant influences while safety and privacy appear to be much less important (trailing accuracy and record keeping) (D.B. Humphrey, 2010).

A Swedish study describes both the fundamental problems and costs of the use of cards and cash in from a social perspective. They estimate that the cost to society of the use of cards and cash amounts to 0.4% of GDP. Cash payments tend to be more expensive than card payments, and the results indicate that cash is over-used. The choice that the consumer makes between card and cash is largely determined by the size of the payment and the age and education of the consumer. The consumer also appears to be influenced by cost implications. A balanced use of withdrawal fees for cash and transaction fees for cards could therefore result in more efficient use of the payment system in Sweden. (Bergman, Guibourg, & Segendorff, 2008). There exist large cross subsidies between different payment services, foremost from acquiring card payments to cash distribution to the public, while payment services as a whole are not subsidized. (Guibourg & Segendorff, 2007). Similar, Poteet and Purches question the rumor that the cash is soon dead. They claim cash is not going away in the near future and may be actually increase in use in some segments of the economy (Poteet & Purches, 2011). This represents a great opportunity for banks, as they will be able to propose valuable and chargeable services to their clients, retailers or other service providers in order to increase their satisfaction and loyalty (Tacchi, 2008).

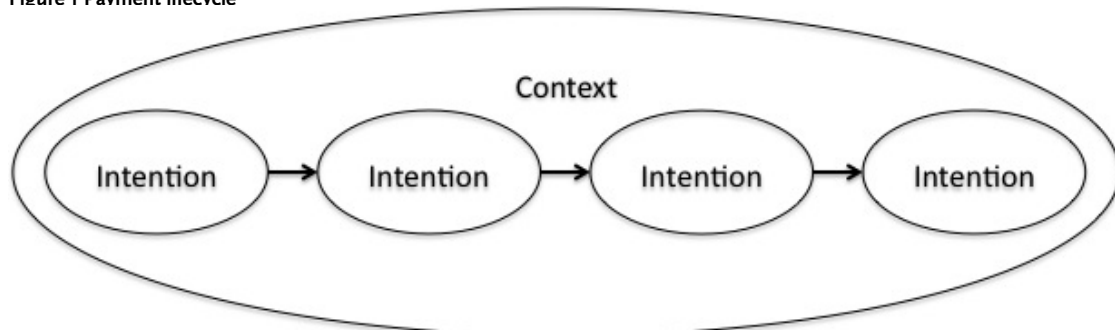
Most of the presented research has a supply perspective on payments. There is, “relatively little of the discussion that addressed the demand side of the market, or such questions as: What types of products are consumers likely to be actually willing to pay for? What are the characteristics of current and likely future purchasers of electronic products and services? How quickly will consumers adopt electronic technologies?” (Kennickell & Kwast, 1997). Kennickell and Kwast’s observation is still valid today. The reason behind the relative neglect of the consumer side is also unchanged. In particular when considering that the financial services sector as a site where the transformative powers of the new electronic technologies would be most visibly enacted.

Total costs of the payments system to society are considerable (Brits & Winder, 2005; Loix, Pepermans, & Van Hove). It is argued that a less-cash society has better chances of success than a cashless one (Brits & Winder, 2005).

### Conclusion

In this paper, we attempt to summarize and synthesize research on payments. To this end, we present a payment life cycle framework that includes the following: intention, choice, use and impact of payment instrument, as well as payment context. Based on the framework of payment lifecycle, we categorized current literature on payments into three main streams: the consumer literature which focus on how different payment instruments impact consumers’ purchasing behavior, the IS literature which pay special attention to people’s intention to adopt new payment instruments, particularly mobile payments, and the economics literature which is mainly concentrated on the developing a more higher level landscape of how payment systems evolves over time as well as the macro-level impacts of such evolvement.

Figure 1 Payment lifecycle



First of all, when we look at the payment lifecycle, few or no research has examined the “choice” stage: while IS researchers mainly fixed their eyes on the pre-choice stage, consumer behavior researchers are more concerned about the impacts after the choice has been made. In other words, the question of why people pay in the way they pay remains largely unanswered. We think it is important for researchers to investigate this unexplored territory. For example, do attitudinal factors play a role in people’s preferences for certain payment methods? Or is such choice making process more based on habit and unconscious decision making? How about the impacts of contextual factors, such as where the transaction occurs and what type of product people is purchasing?

Secondly, the majority of the research on payments we have reviewed relied on quantitative methodologies (experiments, surveys, etc.). We think qualitative methodologies can also be utilized to generate rich findings around this topic. For instance, a case study of how some new payment methods are adopted and accepted in a certain social context will provide a holistic view of the evolvement of



payment systems. Qualitative studies examining how cultural differences influence people's payment preferences can also be helpful to understand how the broader context can affect payment related behavior.

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