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Framework for Mobile Payments Integration

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Abstract: This paper derives a theoretical framework for consideration of both the technologically driven dimensions of mobile payment solutions, and the associated value proposition for customers. Banks promote traditional payment instruments whose value proposition is the management of risk for both consumers and merchants. These instruments are centralised, costly and lack decision support functionality. The ubiquity of the mobile phone has provided a decentralised platform for managing payment processes in a new way, but the value proposition for customers has yet to be elaborated clearly. This inertia has stalled the design of sustainable revenue models for a mobile payments ecosystem. Merchants and consumers in the meantime are being seduced by the convenience of on-line and mobile payment solutions. Adopting the purchase and payment process as the unit of analysis, the current mobile payment landscape is reviewed with respect to the creation and consumption of customer value. From this analysis, a framework is derived juxtaposing customer value, related to *what* is being paid for, with payment integration, related to *how* payments are being made. The framework provides a theoretical and practical basis for considering the contribution of mobile technologies to the payment industry. The framework is then used to describe the components of a mobile payments pilot project being run on a trial population of 250 students on a campus in Ireland. In this manner, weaknesses in the value proposition for consumers and merchants were highlighted. Limitations of the framework as a research tool are also discussed.

Keywords: payments, framework, mobile, value

1. Introduction

Payments are central to the growth of modern civilisations. Payment systems have evolved substantially over time, from earliest bartering systems, to systems based on coins of precious metal, to the virtual payment systems of today (Ferguson, 2008). The mobile phone is capable of providing a bridge between the traditional and the new payment systems, supporting on demand purchase and payment processes in a manner heretofore not conceivable. The transition to mobile phone driven payment processes is not smooth, however, not because of a lack of technology innovation, but because the underlying players in the industry are reluctant to change their existing business models. Banks and their customers are not in agreement as to what constitutes good value in terms of payment alternatives, a phenomenon also found among stakeholders to technology adoption (Au and Kauffman, 2008). Research has suggested that the high failure rate of mobile payment solutions is linked to their inability to provide the right value proposition to customers (Ondrus et al., 2005). Banks promote payment instruments that earn them most revenue. These tend to be centralised and inconvenient. Customers have little choice in selecting payment instruments, but are being seduced by the control and convenience of on-line and mobile payment solutions, which provide flexibility and connivance. Until a solid value proposition emerges that combines value for both banks and customers, the innovation in terms of payment solutions will remain sporadic and piecemeal. This paper explores the existing research domains from which such value propositions or business models could be drawn, and extrapolates a theoretical basis for further research in the area of payments.

The challenge of understanding the driving forces in the market for electronic payments is that there are an accelerating range of solutions that address shortcomings in legacy payment processes. For example, many innovative solutions support the connection of existing bank or credit card accounts to on-line virtual wallet transactions (Olsen et al. 2011), substituting the phone for the desktop computer but without changing the underlying value proposition. Other solutions leveraging the processing capability of Smart phones seek to associate the payment transaction with other customer related processes such as loyalty points programmes, but are by definition focused on a particular segment

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of Smart phone using consumers. While such developments espouse key technology adoption factors such as consumer convenience and ease of use, they also tend to obscure visibility of the comparative value of choosing a particular payment instrument over an alternative.

The language used for describing payments has relied on traditional banking terminology such as payment instruments, or on technological concepts such as connectivity. There are many other possible dimensions for describing payments such as transaction type, payment domains or geographic scope. Indeed one of the difficulties for the development of an ecosystem for mobile payments has been the lack of a common vocabulary between the financial services community and the technology service community. The method used in this study is to categorise the concepts used to describe mobile payments, and map these "technological" categories against factors describing the business setting of procurement and settlement, thereby allowing us to effectively accumulate knowledge, and to interpret previous findings (Dahlberg et al., 2008). This framework is based on the assumption that mobility (Gumpp and Pousttchi, 2005) is simply an extension of the same virtualisation technologies that have been used by organisations since the earliest days of information technology. Rather than considering laptops, PDA's, smart phones and tablets as disruptive technologies (Christensen, 1997), we take the view that their pervasiveness as access devices to processes and information does not fundamentally alter the relationship between people, processes and technology. Virtualisation provides users with visibility and control of resources, and mobile technology should provide this visibility and control on the move.

Researchers have adopted different units of analysis in studying the evolution of mobile payments, including exploring the payments *market* (Dahlberg et al., 2008; Ondrus et al., 2005) in the macro-economic sense, payments *technologies* (Ondrus and Pigneur, 2007), payments technology *adoption* factors (Pousttchi, 2003; Plouffe et al, 2001) or design of mobile wallet (Olsen et al., 2011). In this study, we are interested in understanding mobile payments as an element of a purchase and settlement *process*. In a sense we take a contractual law perspective, meaning that a payment is one part of the fulfilment of a legal contract between a supplier and a customer. From this perspective we are not only interested in the footprint of mobile phones in the payments landscape, but also the topography of that landscape in terms of the actors involved, the nature of the payment and the value to the customer of different levels of payment automation. It is suggested that adding this value dimension (Osterwalder, 2005; Ondrus et al., 2005) helps to conceptualise mobile commerce in the context of micro-economic transactions in public, commercial and social interactions.

The structure of this paper is as follows. Firstly, we provide an overview of the payments industry and why the potential of mobile technology has not (yet) translated into innovative payment instruments. The specific issues surrounding the adoption of mobile payments are then discussed. Based on research in this domain we then describe the dimensions that may be used to delineate the different payment service offerings and scenarios, and from this an integration framework is presented that may be used to investigate the relationship between payment service offerings and the associated value proposition from a customer perspective. The final section discusses the theoretical implications of this paper and it's relevance to existing research.

2. Inertia in the payments industry

Traditionally, the transfer of value from payer to receiver, along with the associated risk, is managed by a small number of highly centralised intermediaries (banks). Funds are transferred from the payer's bank account to the receiver's bank account via a number of physical or electronic payment systems that check each payment against terrorist lists, money laundering lists, credit limit lists, etc. The key value of these centralised systems is managing the risk of account holder liquidity and fraud, and complying with international law, as stipulated by individual countries and supra national organisations. The cost of managing this risk is recouped by levying "interchange fees" on users of these payment instruments, merchants and consumers. A successful business model has thus built up around the use of payment cards, which involves charging merchants and ultimately customers for the facility and convenience of using particular payment instruments. The perceived value for the customer is access to a universally accepted payment instrument, and instant access to significant lines of credit.

The revenues generated from the provision of payment services have been estimated at $900bn, representing 25-30% of total bank revenues. Reluctance to move away from a winning formula no doubt constitutes the principle barrier to faster integration of mobile technology into the payments

ecosystem, but also an opportunity for innovation. Three additional factors contribute to the inertia in the evolution of traditional payments services, related to technical skills, customer expectations and management culture. Firstly, many retail banks run back office payment processing systems that are so old that Universities are now being solicited to create programming modules focused on legacy development environments such as Cobol, PL1 and RPG, such is the reliance on these systems and the associated scarcity of skilled resources. The costs of re-writing back-end payment processing modules is therefore prohibitive. Currently internet banking could be characterised as providing a web-based front end to account information that is embedded in legacy applications, without addressing any other requirements that customers might have with respect to liquidity control, budgeting or access to alternative products. Legacy banking systems were simply not designed to empower customers in this way.

Secondly, the virtualisation of banking and the sense of empowerment among smart phone application users have whetted the account holder's appetite for a different relationship with his or her bank. Providing on-line visibility of customer accounts is the first step in controlling expenditure, supporting customer requirements for flexible payment instruments is the second. Ultimately the integration of bank accounts with planning tools will empower customers to manage their finances in a more pro-active way. Exhibitors at the Finovate Europe 2011 event in London showed a marked tendency towards personal finance management products (PFM), with payment instruments being seen as lifestyle commodities influenced by customer perceptions of value as communicated in social networks.

Thirdly, it is likely that management in both the commercial and retail banking sectors do not have experience of the newer forms of collaborative business models familiar to service providers in the new payments ecosystem. Particularly with respect to mobility and payments, it is clear that financial institutions, in order to achieve critical mass, will have to collaborate with new intermediaries such as hardware vendors, payment solution providers and trusted service managers. The next section discusses the adoption of mobile payments and the likely shape of such a new ecosystem.

3. Adoption of mobile payments

A mobile payment is any payment where a mobile device is used to initiate, authorize and confirm a transfer of value in return for goods and services (Pousttchi, 2003; Au and Kauffman, 2008). Mobile payments emerged in the 2000's, with early successes in the sale of mobile content and services such as ring tones and logos. Later, mobile payments were suggested as an alternative for micro-payments at point-of-sales systems, where the use of cash had been declining for many years. Many mobile and electronic payment solutions have been introduced ever since, but most of them have failed or have had a low penetration rate (Mallat, 2007; Dahlberg et al. 2008). The "chicken and egg" situation for emerging payment models means that enough merchants need to be on-board with any new solution for it to catch on with consumers, but in order to be appealing to merchants there must be a critical mass of consumers interested. Lee et al. (2004) refer to mobile payment *liquidity* as the extent to which it is accepted by sellers and therefore adopted by customers. Au and Kauffman (2008) refer to the theory of network externalities to explain value creation in the networked economy, suggesting that the value of such services to banks and their customers will increase as the network grows. One such failure is the Dancoin (our translation) in Denmark, which did not reach critical mass of users, either payers or merchants. Standardisation and technology maturity have equally been highlighted as key requirements for expansion of mobile payments (Mallat et al., 2004; Lee et al., 2004).

So, while the most popular payment instruments are still cash, debit and credit cards (Dahlberg et al, 2008) with smart cards being the most serious challenger to traditional cash (Dahlberg and Mallat, 2002), the ways to make contactless payments and especially mobile payments are increasing. When looking into the future, companies and experts agree that the mobile phone is the technical device that they will try to turn into the new wallet, mainly because of the diffusion of mobile phones, which no other technical device can match, but also due to the fact that most of us carry our mobile phones with us most of the time (Olsen et al., 2011). If the mobile phone as e-wallet succeeds it will very likely be at the expense of traditional payment instruments. But it is also a possibility that the mobile wallet will simply become a new way of entering the current card and account-based payment services (Dahlberg et al., 2008).

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Contini et al. (2011) describe the mobile ecosystem as a complex set of interconnected entities and relationships which interact to form a stable functioning payments system, with participants including financial institutions, money service providers, handset makers, technology service providers, mobile network operators, mobile virtual network operators, merchants and consumers. Internationally, national governments have individually pledged support to developing electronic payment capabilities as part of the broader adoption of e-Government capabilities, while in Europe, much of this development has been driven by the establishment of SEPA (Single Euro Payments Area). At the same time the European competition agency tends to inhibit banks collaborating on new payment solutions, since this might be perceived as creating barriers to trade.

Understanding the importance of these emerging solutions is the key motivation for developing an integration framework for mobile payments. Webster and Watson (2002) describe how theory in the IS field evolves from ad-hoc classification systems through taxonomies to conceptual frameworks. There is a need for a "robust analysis framework" (Kauffman and Walden, 2001; Au and Kauffman, 2008) to abstract meaning from the myriad technology offerings, and indeed to differentiate between business value and technology capability. Practitioners and academics require an abstracted view of the business requirements and their solutions in order to design lasting solutions. The next section outlines the dimensions that can be used to build this abstracted view.

4. Classifying the dimensions of mobile payments

Mobile payment solutions may be described by a number of attributes that relate either to the process or the technology of making a payment. The process dimension refers to *what* type of payment is being made, and crucially should include the notion of customer value. The technology dimensions describe *how* a payment process works, and typically involves the integration of a number of physical and virtual payment instruments.

4.1 The value dimension

The value dimension, described as a market perspective by Ondrus et al. (2005), or as a *value taker* perspective by Kauffman and Walden (2001), relates to both customer benefits and needs respectively. Ondrus et al. (2005) suggest that it is the failure to address the demand issues that undermine many payment service offerings. It is therefore suggested that the customer demand (value) dimension be used to characterise mobile payments. This dimension will calibrate customer value across a "consumer to merchant axis" (Ondrus et al., 2005; Dahlberg et al., 2007). Clearly the time and location independence afforded by the mobile phone user is an advantage (Mallat, 2007; Kim et al., 2010). Indeed the "anytime, anywhere" accessibility of mobile phones increases merchant access to location specific consumers, thereby potentially instigating demand and increasing sales opportunities, but not necessarily creating customer value. Customer value, for example, might be providing the payer with visibility of, and direct access to, alternative payment execution options, as well as related decision support information such as account balances, loyalty points, discounts and special terms. The customer value here is created through the *information* value as distinct from the *mobility* value (Gumpp and Pousttchi, 2005).

For the purposes of this paper, the value proposition is considered to include the context or scenario (Kreyer et al., 2003) of the purchase and payment transaction. This covers the *nature* of the goods or service being purchased, *where* the payment is being made, and *who* is involved. The nature of the purchase covers, for example, the purchase of physical and digital goods, the payment of utility bills or the purchase of on-line services. The procurement of physical goods by individuals or organisations may be considered to be part of the supply chain. Supermarket shopping for groceries and household goods (B2C) or raw material purchases by manufacturers (B2B) has the characteristics of being repetitive, subject to scrutiny on price, and sensitive in terms of lead time. The point of sale may be physical, virtual or both.

All businesses have payment processes for overhead expenditure related to personnel (payroll, tax and expenses), rent, maintenance, catering or hygiene services. Utility payments could be considered to include energy supply, refuse services, tax, banking services, digital network services and digital content. Transportation related services include local transit tickets, parking, automobile taxation, and fuel, holiday, and airline payments. Consumer goods might include white goods, electronic equipment, computer equipment, clothing and furniture. Leisure and entertainment payments include cinema tickets, concert and event ticketing, use of sports facilities, vending machines and access to

public amenities. Digital content includes phone credit, digital media (music, video, newspapers, and books), gift vouchers and virtual gaming products. Person to person (P2P) payments might include payments to tradespeople, babysitters, and home-helpers, local and cross border remittances, micro-payments and micro-finance. Charity or fundraising donations constitute a section of "person to non-profit" organisation payments (P2NP). Social and Government payments include welfare, pension and health payments (G2C).

On the other hand, the context of the payment also distinguishes the location of the payment and the actors involved. For example, payments may be made from a mobile phone at a point of sale, from a mobile phone remotely, in person at a bank branch, in person at an ATM or payment kiosk, in person at a post office or credit union branch. Payments may be sent by post, or made over the phone, via a digital TV service, or through a gaming or digital content interface such as iTunes. Bill payment services may be made on-line or via physical points of sale such as PayZone and PayPoint. On-line payments may be made via electronic wallets such as PayPal or Boku. Economic definitions of commercial actors include shareholders, debtors, creditors, managers, employees, community and government (Au and Kaufmann, 2008). The purpose of this dimension is to understand where value is being consumed, and by whom.

4.2 The integration dimension

The second dimension for mobile payment attributes relates to the products, instruments or technologies through which the payments are executed. These attributes describe *how* the payment is processed, and are independent of either the transaction types or the payment channels discussed above. This virtualisation axis calibrates the extent to which payment execution has been mobilised (Gummp and Pousttchi, 2005) using information technology. Technology or product related aspects of the mobile payments landscape are more "inward" looking (Dahlberg et al., 2008), defining customer *value making* (Kauffman and Walden, 2001), as distinct from value *taking*. This corresponds to the service provision (vertical axis) on the framework described by Dahlberg et al. (2007). The purpose of this dimension is to understand where value is being created, and by whom.

The payment products include traditional physical instruments such as cash, cheques, coupons, pre-paid gift cards, postal orders and bank drafts. Credit transfer instruments include credit cards, debit cards, Electronic Funds Transfer, Direct Debits and Standing Orders. Mobile phone related instruments include bill to carrier account, bill to credit card account and bill to current account (ACH). Pre-loaded virtual instruments include electronic money accounts, virtual gift cards, and virtual loyalty cards. Payment authorisation options include signatures, passwords (on-line, SMS), PIN number, Chip, card user verification services, voice authorisation or biometric methods. The degree to which the payment is integrated into an enterprise or domain driven process defines an interface dimension including Buy-now, Accounts Receivable, Accounts Payable, Payroll, Expense disbursement, Bank reconciliation or treasury management. Geographic scope for payments may include proximity, local, national, European or global. Payments across different currencies should include exchange rate calculations. The account types from which payments are drawn include unbanked customers, post office accounts, credit union accounts bank accounts (current, credit, deposit, savings), commercial or merchant accounts, e-Money accounts, Mobile Network Operator customer accounts, merchant loyalty account and digital media accounts. Account funding mechanisms include cash loading, SMS with top-up, Direct Debit, wire transfer, electronic funds transfer, credit transfer by SO/DD from third party bank account, remittances and on-line e-Money transfer. Device connectivity options include credit cards, such as Visa / Mastercard, debit cards, such as Maestro / Cirrus / Laser, Internet (TCP/IP, GPS, WiFi), Bluetooth and NFC. Clearing and settlement options include paper (e.g. IPCC), electronic (e.g. IREPCC), Credit Card and ATM. Timing of payment execution may be in advance, at moment of purchase, days or weeks after purchase.

4.3 An initial framework for mobile payments integration

Drawing on the discussion regarding the dimensions of payment integration (virtualisation) and value (merchant to consumer axis) in the previous section, a framework is proposed to conceptualise the position of mobile payments within the greater context of electronic payments. This framework is presented in Figure 1. In this framework, payment integration is conceptualised as an on-going process of reconciling demand with supply. The degree to which payment processes are integrated, or supported by electronic means, is recognised as an economic lever in the value proposition to customers. The information that is valuable for consumers (as individuals or enterprise buyers) in

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making payments is defined along two dimensions, one related to the level of visibility of purchase and payment information, and one related to control of the transfer of value.
The purchase control dimension maps the gradation between a commitment to purchase and settlement of the amount due. This axis is temporal, left to right, representing the stages between the commitment to purchase and the actual transfer of value (ultimately there is value in offering a consumer the ability to intervene at these stages). The payment integration dimension refers to the degree to which the attributes of payments (both supply and demand related) are known and communicated, and represents a gradation from traditional physical payments instruments to increasingly virtual payment instruments. It is only with the virtualisation of payment information that it is possible compare the cost of a planned expenditure with the actual availability of funds (budget).

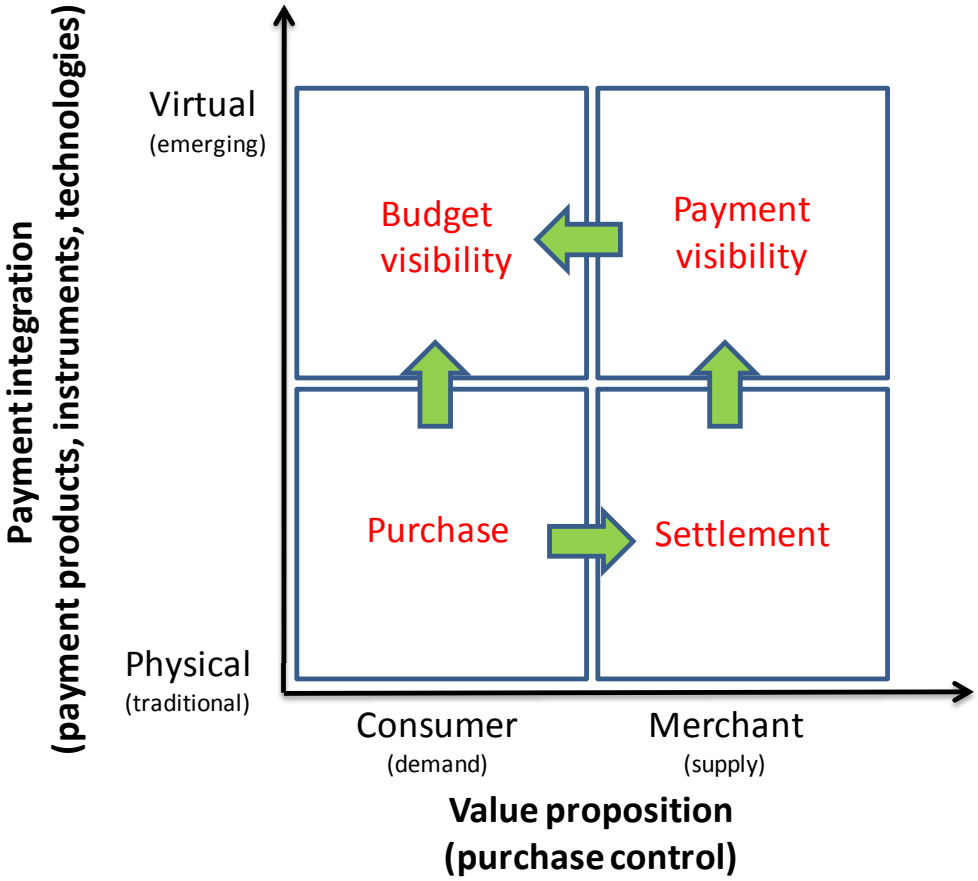


Figure 1: Integration framework for mobile payments

The quadrants represent stages in the value proposition to consumers in electronic payments. The purchase (bottom left) quadrant represents the buyer's commitment to purchase. With traditional physical payments instruments, visibility of budget information is limited. Information that would be valuable to the buyer at this point relates to product supply (for example, price, discount or loyalty credits), but also related to the available consumer budget. How this information is provided is a question of integration. The budget visibility quadrant (top left) represents the degree to which visibility of available funds can be provided. This may also entail electronic decision support tools to inform the consumer's decision to purchase.

The settlement quadrant (bottom, right) represents the actual transfer of value from the consumer to the merchant, which may be automated or happen in stages. Payment in cash is instant settlement whereas payment by card is deferred settlement. The payment visibility quadrant (top right) represents the degree to which settlement information is available. This visibility provides the merchant with his confirmed revenue and the customer with his real time budget position.

5. Application of the framework to mobile payments pilot project

The illustrative case study is a five month NFC (Near Field Communication) enabled m-payment project that goes live in February 2012. The scope of the project includes payment for goods at the

point of sale, loyalty points and physical access to buildings and rooms via an embedded staff card. The project began as a concept to evaluate if students and staff could "leave their wallets at home" by embedding typical wallet functions into the phone. Purchases at a point of sale are provided via a virtual wallet maintained on-line. The virtual wallet, which is based on a standard pre-paid debit card, can be topped up at specific points of sale (with cash) or on-line (with access to other on-line funds). Participants will also be able to make peer-to-peer payments between on-line wallets.

The researchers have been working with a Mobile Network Operator (MNO) on the scope of the project. The goal is to investigate customer adoption and customer retention issues in a controlled environment. Aimed at retail payments at any of the 20 points of sale on campus (cafés, restaurants, bars, convenience stores, newsagents), this research is aimed at the micro-payment area (sub-€15 expenditure). The research objective is to understand the acceptability of contactless payments and associated customer behaviour over a period of 20 weeks from February till the end of June in 2012. Participants in the pilot have been recruited such that there is a balance in their consumer profiles. A range of ages was sought by including both students (18-23 years old) and staff (30-60 years old). Certain staff participants were sought because of their role as stakeholders, for example, senior university management, buildings and estates staff, security staff and merchant staff involved in point of sale activities. A gender balance was sought across the sample, and for students there was a breakdown between those living at home and those living in rented accommodation. As possibly the most price sensitive segment of the consumer market, it was important to understand the constraints that students face in terms of disposable income. In addition, certain criteria related to experience to date with smartphones, with a balance sought between those who were already users of smartphones and those who were not. As the project involved the distribution of new NFC enabled handsets to participants, there was a breakdown between participants who wished to retain their existing mobile phone and contract. In these cases, participants are offered a new SIM card and mobile number for the project.

The researchers screened and selected over 225 participants who were characterised as "Generation Y". Participants were also selected from naturally formed groups (i.e. second year undergraduate students) as such groups tend be more relaxed and at ease in conversations. At the pre-launch phase, which took place in November 2011, six focus group interviews consisting of four to eight participants were carried out. The researchers were also engaged in the preceding stakeholder meetings with merchants, mobile network operator, and the NFC terminal provider; and face-to-face interviews with each of stakeholders are on-going. Individual interviews rather than focus group interviews with the two participating merchants are judged to be preferable as they are competitors on the college campus and both provide food and retail services to over 17,000 students on a daily basis.

The project aims to provide valuable insight and experience in cashless payments in a restricted environment that mimics quite adequately the retail environment of the high street. Ultimately the project will extend to businesses in the vicinity of campus, which are all subject to the same ebbs and flows of business as campus based merchants. The key issue for campus points of sale are that congestion tends to build at hourly intervals due to the nature of the timetable for lectures. This means that on the hour, every hour, all the points of sale experience an influx of customers. The potential benefit of a mobile payment option in terms of convenience and speed is therefore significant.

5.1 A case study approach

A case study approach is employed in this study, since it permits the researchers to examine the phenomenon in its natural setting and employ multiple methods of data collection. Case studies are also suitable for researching an area in which there is a paucity of research and to finding answers to "how" and "why" questions (Benbasat et al., 1987). At each phase, the researchers use focus group interviews and on-line surveys. The focus group method is suitable for qualitative data gathering (Calder, 1977) and has been employed in previous mobile service studies (e.g. Mallat, 2006), which demonstrates its suitability in this study (Jarvenpaa and Lang, 2005; Garfield, 2005). Using multiple methods of data collection techniques to study the same phenomenon provides the opportunity to triangulate, thus reinforcing the conclusions of the study (Benbasat et al., 1987).

An important aspect of this research is the longitudinal nature of the study, where spending habits and user acceptance may be observed over an extended period. One of the key questions for MNO's regarding mobile payments adoption has been how to stimulate continued usage over time, after the "novelty effect" wears off. Loyalty programmes are a key driver in this area, but also the observed

value to consumers of using this new payment channel. The value that a consumer perceives in using the phone for payment must be reflected in a merchant willingness to promote the channel, and this project provides a stage on which to study the motivations and business model of the infrastructure providers in this regard (MNO, payment acquirer, issuing bank, acquiring bank and merchant).

The project consists of three distinct data gathering phases: pre-launch (Nov 2011), mid-pilot (April 2012), and end-pilot (June). The purpose of the pre-launch phase was to understand the anticipatory context: awareness and perceptions around payments, understand impacts and reactions during the launch phase. The purpose of the mid-launch phase is to track and evaluate usage and behaviour: gain insights into functionality and performance of the system, identification of drivers and barriers to adoption. The purpose of the late-launch phase is system evaluation and generation of developmental insights: establish where improvements can be made to enhance consideration and usage of the system.

5.2 Preliminary findings

During the focus group interviews at the pre-launch stage, participants were invited to discuss the value-propositions been offered by the use of the NFC enabled phone and the service providers (e.g. research question 1). Key themes that were discussed included: their understanding of the m-payment concept, the value propositions that would entice them to a) migrate and b) remain with a new mobile network operator, and the barriers that would prohibit them from participating in the trial. Participants strongly favoured customer loyalty schemes that offered a range of options, instant or short-term rewards, and the ability to use the rewards with other branded goods and services. Key barriers to participating in the project included: top-up charges, the use of a low-end smartphone due to its limited functionality and the fear of technical errors at the point-of-sale once the project is live.
Interviews with the merchants revealed that they anticipate the potential of m-payments in terms of it reducing the time and cost required to managing physical cash, as well as, a faster through-put at peak service times (e.g. 12pm-2pm). Merchants expressed a high level of commitment to the project on condition that they did not incur the cost of installing the NFC enabled terminals at the 31 point-of-sales located on campuses. Yet, even at the prelaunch phase, the issue of cost has remained "unelaborated" and could be a decisive factor in the next phase of the project.

Specific to the question the value dimension, the researchers have identified that infrastructure management is a central issue that requires diplomacy, coordination and the need for a shared terminology amongst the integration partners. The integration partners in the project include: the mobile network operator, handset and operating system manufacturer, the SIM card manufacturer and SIM card integration team, the mobile wallet application developers, the funding account and card issuer, the payment transaction processor, the NFC terminal provider, and IT technicians from the host university.

Key to the adoption by merchants of a new payment channel is the associated interchange costs. In the pilot study, the MNO is providing a new way of accessing traditional payment rails, but not intervening in terms of the contract between the merchant and the payment processor, meaning that there is little or no advantage for the merchant to promote this method. Furthermore, although loyalty is perceived as key in retaining m-payment customers, this is equally seen by the MNO as an aspect of the customer relationship to the retail outlet, instead of being considered as loyalty to a merchant and payment channel. These findings present an early indication that the cultural barriers to new business model development are significant, with players inevitably burdened by their inherited perceptions of customer value propositions. The next stages of the research study will yield a wealth of observations that will allow us to develop an intricate understanding of the dynamics of m-payment solutions.

These early findings provide a basis for judging the applicability of the integration framework, see Figure 2 for an illustration. The value proposition for m-payments in the pilot case is presented as a series of steps in a specific customer scenario, where a consumer pays for coffees and snacks at a point of sale for a total bill of €10. The various steps in the purchase and settlement process are mapped on the framework. The customer pays by mobile phone, which is convenient and merits loyalty points from the merchant, but incurs top-up costs. For merchants, providing customers with a fast and convenient way to pay for goods increases throughput at peak busy periods, thereby increasing revenue. The payment authorisation transaction, involving a card network, an acquiring bank and an issuing bank, each charging for the processing of the transaction, results in a total

charge of 22c to the merchant for the €10 spend. These figures are based on standard interchange fees for credit card transactions of 2.16% (the case study is based on the use of a pre-paid debit card from one of the major networks for account funding, the interchange rates to be applied are not available at the time of writing the paper). Using this account also incurs a top-up charge for the customer of 48c per top-up. The settlement of the €10 transaction therefore results in the merchant account being credited with €9.78 (retail price minus interchange), the customer being debited for €10.48 (cost of goods plus top-up charge).

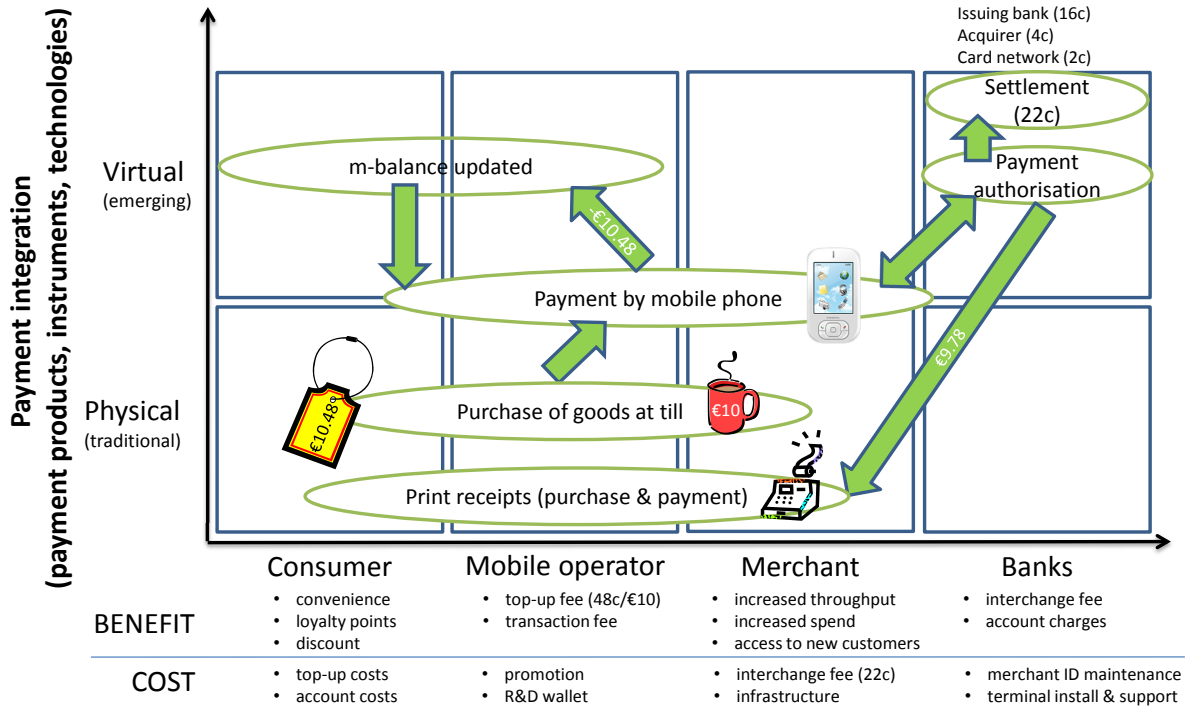


Figure 2: Value proposition for m-payments in pilot case

The value proposition for consumers and merchants is unconvincing based on this case study. Customers will be penalised by using this payment instrument, although clearly they may recoup some of the costs through loyalty points. However, given the number of partners involved, and their cultural background, it is not clear how the ownership of the customer relationship will be negotiated. Equally, in this case merchants are paying (dearly) for the right to offer their customers a new payment channel. In fact the only winners in this scenario are the banks who acquire a new source of interchange fees for little infrastructure outlay. The only initial cost to the card issuers and acquirers are the marketing and promotional costs associated with setting up the new virtual wallet accounts, the development resources to test the new terminals, and any overheads associated with new merchant ID's. These are the same costs associated with the sign-up of any new customer base. The card network equally invests initially in the development of the wallet and security integration.

One limitation with the framework is that it does not show the recovery of value by the customer in terms of loyalty points. Although it is clear that usage of this payment channel will be stimulated through the use of loyalty points, it is not clear in this case what the customer relationship is between merchants, mobile operator, banks and customer. Incredibly, the mobile operator expects that the merchants should offer increased loyalty points for the use of the new payment channel, while simultaneously expecting the merchant to bear the burden on interchange costs with the banks. Underpinning the case are the twin assumptions that in order to use a mobile phone for payment, the customer must open a new bank account, and, secondly, that both the customer and merchant are prepared to pay a premium to allow payment by mobile phone. One of the most significant outcomes of this research will be the testing of these assumptions, which are undoubtedly inherited from the business models that apply to existing payment instruments.

Neither does the framework show the other payment use case envisaged in the pilot study, peer-to-peer payments. The cost of making a payment between two mobile wallets was not available at the

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time of study. The success of such payment schemes in developing countries, particularly those where populations were unbanked, suggests that this model will be of significance where there are strong economic constraints on budget. Students are astute shoppers, and often underbanked, so it will be of interest to the researchers to gather data on the adoption and customisation of peer-to-peer payment features during the project.

6. Discussion and conclusion

The proposed integrated payment framework highlights the difference and relationship between payment integration and value proposition. It also strives to increase theoretical parsimony by integration of previous literature, such as Ondrus et al. (2005), Mallat (2007), and Kim et al., 2010) into a two by two matrix. The validity of the framework can be assessed by three particular properties: the integration of the framework (logical coherence), its practical and theoretical relevance, and its relative explanatory power (Glaser, 1978). These properties are derived from Glaser's (1978) work on theoretical sensitivity and have been applied in previous research (Hedman and Kalling, 2003). The logical coherence is addressed in the previous section and will not be further addressed here.

There are both practical and theoretical aspects to the relevance of the framework. Firstly, it facilitates discussion of the nature of information required by consumers and merchants and the associated value they may place on the automation and visibility afforded by payment integration. It was shown, for example, that despite the lack of a convincing value proposition to customers (Ondrus et al., 2005), mobile operators are not well disposed to designing such propositions, being focused on extracting revenue from only one piece of the mobile payment transaction. Disintermediation of services is unsurprisingly perceived by consumers as an opportunity for more charges to the consumer to support the multiple partners involved in the provision of the service. This might be considered paradoxical from the point of view of the technical integration occurring (sharing of customer data, sharing of payment transaction information). A customer might be forgiven for expecting that technology driven integration should drive greater value for the consumer at the transactional level.

For example, visibility of available budget to spend could be an extremely valuable feature for consumers in making purchase decisions, particularly in periods of economic pressure, but the implementation of this feature may imply sophisticated design scenarios, with each of the integration partners ultimately looking for some compensation for that effort. In the case studied, the virtual wallet on the phone will be updated with an outstanding balance, giving customers a reactivity that was hitherto impossible with legacy payment instruments. Indeed this visibility is of significant value for consumers, for which they may be prepared to pay a premium. The visibility provided by traditional credit card networks for both consumers and merchants is significantly less automated, but merchants will sacrifice margins for the convenience afforded to consumers, who in turn are prepared to pay for the line of credit. However, it is not clear that merchants will understand the value proposition for the new mobile payment channel, and particularly how it relates to existing channels. The lack forethought concerning the value proposition (for both customers and merchants) in advance of the technical implementation appears to be hampering the success of the project.

The application of the m-payment integration framework for the case study necessitated some extensions to allow for the different players on the value dimension. As well as consumers and merchants, it was useful to depict also the mobile operator and banks. The value proposition is summarised on the horizontal dimension by summarising the key benefits and costs for each of the players involved. In this sense the theoretical framework has been enriched through contact with the field. Further research incorporating other use cases for mobile payments should validate what other players and attributes would be required to coherently portray the value proposition for dis-intermediated payments. Of particular interest, for example, would be the notion of payments being made via the mobile network account, that is, the use of phone credit to pay for products and services other than calls and texts.

The interfaces between the quadrants, represented by the arrows, are points where integration decisions may be conceptualised. For example, the use of cash versus direct debits versus online payment can be positioned along the payment integration axis. The question of mobile payments involving settlement from a bank account, credit card account or carrier account could also be represented on this axis. In the case studied, settlement was via a pre-paid debit card account, but there would be value in using the framework to make these settlements and funding account choices

visible. As mentioned above, the value of visibility and control afforded by mobile payment transactions requires further research, as there are probably different use cases in which the increased visibility is considered worth paying for.

The framework provided a basis on which to consider the contribution of payment integration to the value proposition for consumers and merchants. On the one hand, mobile payment solution providers offer convenience based services to consumers, and, on the other, consumers have control and visibility requirements related to planning for and making payments. As we have seen in the case study however, the crucial nature of the value proposition needs to be addressed as much as the technology solution. The framework allows for the consideration of both these dimensions, and in so doing, provides a unique approach to highlighting the key questions underpinning the adoption of technology in a commercial environment.

The framework is extremely meaningful for the players in the payments ecosystem: financial institutions, payment solution providers, merchants, mobile network operators and, ultimately, consumers. Using the framework, the evaluation of innovative payment technologies can take place in the context of actual customer and merchant value. The framework is developed to conceptualise the driving forces in the mobile payments industry, in that sense it builds on the existing body of theoretical work (for example, Au and Kauffman, 2008; Ondrus et al., 2005, Mallat, 2007, and Kim et al., 2010). Furthermore, it is felt that the framework brings to centre stage the notion of customer value discussed in such literature.

Further research on this topic should entail validating the framework empirically on a range of different emergent payment scenarios, for instance Google wallet or bio-metric payments. Such research should aim to clarify the collaboration decisions for players in the market for mobile payments. Notably, the framework should provide a basis upon which infrastructure partners might engage in meaningful debate around the costs to consumers and merchants of making mobile payments. On the basis of these collaboration discussions, real progress in the provision of consumer oriented payment services that leverage the “anytime, anywhere” visibility and control of the mobile phone might be envisaged. Research should focus less on gathering consumer data on adoption patterns and technical features, and more on facilitating the discussions between the collaborative partners, and on developing a vocabulary for the conceptualisation of what value in payments means for a consumer, a merchant, an infrastructure provider or a financial institution.

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References

Au, Y.A. and Kauffman, R.J. (2008), The economics of mobile payments: Understanding stakeholder issues for an emerging financial technology application, Electronic Commerce Research and Applications, (7), pp. 141–164.

Benbasat, I., Goldstein D.K. and Mead M. (1987). The Case Research Strategy in Studies of Information Systems. MIS Quarterly 11: 369-386.

Calder, B.J. (1977). Focus groups and the nature of qualitative marketing research. Journal of Marketing Research: 353-364.

Christensen, M. (1997), The Innovator’s Dillemma, Harvard Business School Press, Cambridge, MA.

Contini, D., Crowe, M., Merritt, C., Oliver, R. and Mott, S. (2011), Mobile Payments in the United States, Mapping Out the Road Ahead, in proceedings of the Mobile Payments Industry Workshop, Federal Reserve Banks.

Dahlberg, T., Mallat N., Ondrus, J. and Zmijewska, A. (2008), Past, present and future of mobile payments research: A literature review. Electronic Commerce Research and Applications, 7(2): pp. 165-181.

Dahlberg, T. and Mallat, N. (2002), Mobile payment service development-managerial implications of consumer value perceptions, Citeseer.

Ferguson, N. (2008), The Ascent of Money: A Financial History of the World. The Penguin Press.

Garfield, M.J. (2005), Acceptance of ubiquitous computing. Information Systems Management 22: 24-31.

Glaser, B.G. (1978), Theoretical sensitivity. Mill Valle: Sociology Press.

Gumpp, A. and Pousttchi, K. (2005), The ‘‘mobility-M’’ framework for the application of mobile technology in business processes, GI Jahrestagung Informatik, Bonn, Germany, September.

Hedman, J. and Kalling, T. (2003), The Business Model Concept: Theoretical Underpinnings and Empirical Illustrations, European Journal of Information Systems, 12(1), pp. 49–59.

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Jarvenpaa, S.L. and Lang K.R. (2005). Managing the paradoxes of mobile technology. Information Systems Management 22: 7-23.
Kauffman, R.J. and Walden, E. (2001), Economics and electronic commerce: survey and directions for research, International Journal of Electronic Commerce, 5(4), pp. 5–116.
Kim,C., Mirsobit, M. and Lee, I. (2010), An empirical examination of factors influencing the intention to use mobile payment, Computers in Human Behavior, 26, pp. 310–322.
Lee, C.P., Warkentin, M. and Choi, H. (2004), The Role of Technological and Social Factors on the Adoption of Mobile Payment Technologies, proceedings of the 10th Americas Conference on Information Systems (AMCIS), New York, August, pp. 2781-2786.
Mallat, N. (2006). Exploring consumer adoption of mobile payments - A qualitative study. The Journal of Strategic Information Systems 16: 413-432.
Mallat, N. (2007), Exploring consumer adoption of mobile payments - A qualitative study, The Journal of Strategic Information Systems, 16(4), pp. 413-432.
Mallat, N., M. Rossi, and V.K. Tuunainen (2004), Mobile banking services, Communications of the ACM, 47(5), pp. 42-46.
Olsen, M, Hedman, J and R Vatrapu (2011), e-wallet Properties, ICMB 2011, The 10th International Conference on Mobile Business, Como, Italy, 20-21, June.
Ondrus, J., Camponovo, G. and Pigneur, Y. (2005), A Proposal for a Multi-perspective Analysis of the Mobile Payment Environment, proceedings of the International Conference on Mobile Business, ICMB'05.
Ondrus, J. and Pigneur, Y. (2006),Towards a holistic analysis of mobile payments: a multiple perspectives approach, Electronic Commerce Research and Applications, 5(3), pp. 246-257.
Ondrus, J. and Pigneur, Y. (2007), An assessment of NFC for future mobile payment systems, proceedings of the International Conference on Mobile Business (ICMB'07),Toronto, July, pp. 43-53.
Osterwalder, A., Pigneur, Y. and Tucci, C.L. (2005), Clarifying Business Models: Origins, Present, and Future of the Concept, Communications of the Association for Information Systems, 16(1), pp. 1-25.
Plouffe, C.R., Vandenbosch, M., and Hulland, J. (2001), Intermediating technologies and multi-group adoption: A comparison of consumer and merchant adoption intentions toward a new electronic payment system, The Journal of Product Innovation Management, (18), pp. 65-81.
Pousttchi, K. (2003), Conditions for Acceptance and Usage of Mobile Payment Procedures, conference proceedings of the Second International Conference on Mobile Business, Vienna, pp. 201-210.
Webster J. and Watson R.T. (2002), Analyzing the Past to Prepare for the Future: Writing a Literature Review, MIS Quarterly, 26(2), pp. xiii – xxiii.