

Modeling the Market Adoption of Mobile Payment Solutions

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Abstract— As mobile commerce becomes increasingly acceptable, mobile payments (m-payments) are now predicted to have a brilliant future. In order to exploit this growing opportunity, a number of innovative m-payment products have been brought to the market by many firms in recent years by taking advantage of the rapid technological progress. However, the evolution of m-payment market is subjective to scores of speculative scenarios that have led to many new product failures. The central issue of concern here is observed to be the problem of choice by the customers. Although many commentaries are available in the existing literature on the status of mobile commerce acceptance in general, there is no focused effort so far to explore the market adoption of m-payment solutions. To address this critical gap, an exploratory study has been conducted on the market adoption of m-payment solutions. With the support of two cases, the present paper reports the antecedents of market adoption of m-payment solutions.

Keywords— B2B Marketing, Mobile Commerce, Mobile Payment, Technology Adoption

I. INTRODUCTION

WHILE the e-commerce is mostly about buying and selling, the mobile commerce, widely referred to as m-commerce, is expected to be largely data-driven. Of course, the ever growing number of mobile phone users as target group represents an enormous potential for mobile commerce (MC) as a new level of electronic commerce. Here, MC refers to any transaction, either direct or indirect, with a monetary value, implemented via a wireless telecommunication network. So far, mobile applications are mostly the transformation of conventional Internet applications or e-business models on mobile devices (Nohria and Leestma, 2001; Sadch, 2002), which is not sufficient for being successful in a MC setting. Added values are indeed necessary; and most of these values colour themselves in the aspirations and expectations of the various actors involved in MC.

The cost of MC technology licenses by market players in several developed economies appears to be out of proportion with previous expectations. Coupled with falling ARPU (Average Revenue Per User), designing a killer application so as to generate substantial revenues rapidly is becoming a

priority for the various actors involved. Recent strains of public disagreement between two leading Indian players over the proposed sale of 3G spectrum reiterates that the need is not limited to the developed economies alone (Saji, 2007). In any case, the demand for next generation mobile technologies is increasing as more mobile services are required to be made available to the mainstream mobile services market. This contemporary trend is visible in the Indian situation too (Saji, 2007). For instance in India, during 2005, the music downloads via mobile phones alone had constituted about 20 per cent of the size of the entire Indian music industry. Additionally, a recent hit in the Reality-TV show generated close to US\$ 4 million in revenues from MC through its innovative voting features, indicating that the market is also maturing in India.

The growth in this area is dependent on the technological and infrastructural support available (Sadch, 2002; Cai et al, 2004). At present in India, the 2.5G, 3G, and WCDMA mobile communication technologies are available as platforms for the deployment of communication, business, and entertainment services. With MC technologies gradually becoming available, the development and deployment of mobile services is becoming an increasingly attractive market for the service providers, content providers and MC solution providers. For greater acceptance of these services, quality and performance must be ensured through the integration of mobile support services. An example of necessary mobile support services is mobile payment (m-Payment) services, which would provide common payment solutions to mobile services.

It has already been predicted that m-Payment will become a successful mobile service for the reason that in addition to the necessity support services, the growth of MC relies vitally on effective payment solutions provided by m-Payment services and vice versa (Constance, 2001; Lee and Benbasat, 2004). It is a fact that, at present there is an uncertainty as to whether the adoption and use of m-Payment technologies will prevail as expected. In all the markets, there is an uncertainty caused primarily due to the lack of standards and the immaturity of the market (Siau and Shen, 2003). However, financial institutions and mobile service providers are trying to overcome these issues by launching isolated initiatives for responding to the ever changing market needs (Lee and Benbasat, 2004). One of the possible consequences of this phenomenon is that collaboration between banks and mobile service providers would become limited as both want to control most of the assets in the value chain so as to increase

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their revenues (Johne and Storey, 1998; Wu and Wang, 2005).

Though a number of proven m-Payment technologies are available in the Business to Business market, the real issue of m-Payment technology adoption is currently being faced by almost all m-Payment service providers (Constance, 2001; Karnouskos and Fraunhofer, 2004; Wu and Wang, 2005). The central issue of concern here is observed to be the problem of choice. Since the outcome of the choice can only be known in the future, the technology buyer is forced to deal with uncertainty or risk. Perception of risk and resulting trust are assessed to be pivotal aspect of the technology buyer behaviour (Cai et al, 2004; Lee and Benbasat, 2004). Although numerous papers are available in comparable context in e-Business, there are very few studies emerged so far in MC. To address this critical gap, it has been decided to initiate an exploratory study on m-Payment solution adoption process in the business-to-business context. The study has been organized by employing a case study method; specifically two international cases have been chosen for exploring the antecedents of market adoption of m-payment solutions.

II. THE TWO CASES

Historically, the m-Payment opportunity arose with the advent of MC. For greater acceptance of MC services, it was necessary that quality and performance be ensured through integration of necessary support services (Mueller-Veerse, 1999). It was then that MP emerged as the critical support service. MP was touted, by a number of independent researchers (Feldman, 2000) and research institutions (Lussanet, 2001) as the long awaited 'killer application' for the telecommunication industry. In concordance with that belief, numerous m-Payment solutions (MPS) were launched by the likes of financial institutions, mobile operators and independent players. However, of the several solutions proffered, only a handful met with any semblance of success. Most of the solutions, as listed by Carat (2002), survived a few months only, which indicates the inert m-Payment technology adoption at the business-to-business (B2B) market.

In order to explore this intriguing business situation, and thereby to identify the antecedents of B2B market adoption of m-Payment solutions, it has been decided to conduct a detailed exploratory study on two business cases, viz. Smart Money and MTN Banking. While the former is a case of acknowledged achievements, the latter (a venture by MTN/Standard Bank) is yet to find appreciable success. Here the 'success' is defined as the extent to which the business objectives of the marketer are being met with.

III. CASE-1: SMART MONEY

SMART Money is the m-Payment technology-intensive product offered by the SMART Communications in conjunction with Banco de Oro (BDO) in The Philippines. SMART Money product was first introduced in December

2000 and has gone through several iterations. The product is essentially a facility for linking the user's phone to a cash account, which operates entirely on a credit basis.

A. Customer Sign-Up

For the customer wishing to become a SMART Money customer, the application process is relatively simple. The customer must register by visiting a SMART office and signing up for the service with a proof of identity. Registration may involve a free SIM card upgrade and it is necessary for the customer to have the phone available at that time. As GSM phase2 SIM standards have been in operation for at least five years, the majority of customers on the SMART network have compatible handsets; as such it was not an issue. The customer will normally be encouraged to sign up for the associated debit card. If the customer applies at an office that has no card-printing facility, the card can be mailed or picked up over the next day or two. If the customer chooses to not have a card, then there is no charge levied for the sign-up.

B. Cash Transactions

Cash transactions may take place at designated locations only. This includes SMART and BDO offices along with a range of accredited retailers. If the depositor has opted for the debit card, then it can be used in a cash deposit terminal available at some location. The terminal accepts the card and currency notes in payment with a minimum note size of P100 and the minimum deposit is set at P500. It is to be noted here that these are country-specific requirements unrelated to the technology.

C. Retail Purchasing

One possibility is to use the debit card, in which the payment is completed according to the set procedures. The other alternative can be used at participating retailers only; and that involves the retailer originating the transaction request through his own SMART mobile phone terminal. Subject to the customer having a credit balance to cover the intended purchase, the customer receives an authorization request via SMS. Once authorization is given, the retailer and customer accounts are updated.

D. Other Services Offered

Further value added services have been launched. While this wide range of features is not necessarily related to the technology, it indicates what can be done to make the service useful and attractive to the customers. These services include: Airtime transfer among customers; Credit transfer among consumers; Direct credit to employee on Payroll; Prepaid Top-Up; Bill payment; International remittances from overseas Filipino workers; Mobile Banking; and Merchant Opportunities.

E. Automatic Transaction Update

This feature, which is built into all the transaction services, provides for a text message to be sent to the user whenever a transaction is performed (in addition to the paper receipt, wherever applicable), whether by the use of the phone directly

or by way of the bank debit card. This feature operates at all times on all transactions and provides the customer with a level of trust in the use of the product. As an added safeguard, the customer has free access to the current credit balance using the menu on the phone and can also request a printed statement of the transactions at a nominal charge.

F. Service Charges

For the basic service with no debit card facility, there is no initial fee. All costs are transaction related. If the card option is chosen, there is an ongoing annual charge of P220 (US\$4) for the facility in addition to the transaction charges. The transaction charges are few and fairly simple, viz. Every customer-initiated SMS (for any value added service) costs P2.5 (US5¢); Retail purchases using the phone incur a P1 SMS fee (US2¢), which is also the standard SMS fee; Cash deposits and withdrawals through a cashier attract a fee of 1% of transaction value; Cash deposit using a card is free; Cash withdrawals at BDO ATMs are charged at P3 (US6¢); and Cash withdrawals at other ATMs are charged at P11 (US21¢).

G. Service Load

The Philippines is noted as arguably the world's leader in the use of text messaging. The market developed around very low charges for SMS calls, currently P1 (US2¢). The result was a very high uptake and use of SMS. Current industry estimates place the SMS usage in the country at around seven SMSs sent per customer per day; and at that level, The Philippines networks have had to equip two data channels for control channel and SMS functions in place of the usual one such channel. In that context, the introduction of SMART Money has not caused a major problem. SMART report no network or SMS overload from the introduction of the service; and while exact transaction loads are not available, best estimates place the added load at two SMS calls per customer per day for those customers on the system.

H. Market Uptake and Summary Comments

As of 2005 November, the customer base was approximately 20 million, of which 2.5 million had subscribed to SMART Money. Of these, around 1 million have implemented the full feature set, i.e. they have taken the debit card option. A major driver in this context was the ability to recharge prepaid services by quite small amounts. Almost all the company's prepaid users (98 % of total customer base) utilize the OTA recharge feature either directly by transferring credit from SMART Money or by purchasing airtime in sachets from around 7,00,000 co-operating dealers. Of the estimated eight million overseas Filipino workers, over one million are transferring almost US\$50 million per month into The Philippines economy through SMART Money. Users transferring airtime contribute a load of around one transaction per customer every four days. SMART Money transactions are approaching US\$100 million per month, all of which pass through the BDO network; and the banking partner, BDO, reports an added cash float of around US\$10 million.

IV. CASE-2: MOBILE MONEY

MTN MobileMoney is the m-Payment service product offered by the Joint Venture firm set up by MTN Company and Standard Bank in the South African market. It has several related products that provide customers with flexibility in managing their mobile services and using the m-Commerce facilities. MobileMoney was first introduced in South Africa by MTN in late 2005, and is an extension to the other related products offered by the company. The MobileMoney product is essentially a facility for linking the user's phone to a 'cash' account. It also operates entirely on a credit basis. As in all jurisdictions, there are controls on the movement of cash with particular emphasis on security, bank liquidity, and the elimination of money laundering opportunities. In this case, MTN has left all such activity in the hands of Standard Bank and as a result, it is Standard Bank's responsibility to meet the Central Bank requirements.

A. Customer Sign-Up

For the customer wishing to become a MTN Money customer, the application process is relatively simple. The customer must register by visiting a MTN or Standard Bank office, and sign up for the service with a proof of identity. The customer needs to produce (in line with banking regulations) a valid South African ID document, an MTN contract and a 32K SIM card and compliant cell-phone. A cash deposit into the account is not required at that time; nevertheless without a cash balance in the account, no purchases or withdrawals can be made. However, having opened the account, others can transfer credit into it.

B. Cash Transactions

Cash transactions may take place at designated locations only. With the card, customers can also make deposits at any EasyPay pay point, such as Pick 'n Pay, Shoprite, Checkers, Lewis, Lifestyle Living, Best Electric, Foodworld and at certain Spar, Boxer and Score outlets. Deposits will be reflected in the account within 24 to 48 hours of making the deposit. Daily transaction limits are placed on individual accounts, though they may be altered to suit individual needs.

C. Retail Purchasing

One possibility is to use the card wherein the payment is completed according to set procedures. The other alternative can be used at participating retailers only, and that involves the retailer originating the transaction request through his own MTN mobile phone terminal. The customer receives an authorization request via SMS, subject to the customer having a credit balance to cover the intended purchase. Once authorization is given, the retailer and customer accounts are updated.

D. Other Services Offered

Further value added services have been launched. While this wide range of features is not necessarily related to the technology, in this case too, it indicates what can be done to

make the technology-intensive m-Payment service more useful and beneficial to the customers. The value added services include: Airtime transfer among customers, Credit transfer among consumers, Direct credit to employee on payroll, Prepaid Top-Up, Bill payments, and Mobile Banking.

E. Automatic Transaction Update

Each time the customer uses their MobileMoney MasterCard to purchase goods and services, they will be sent an SMS confirming the transaction immediately. The customer must enter their Bank PIN on the cell phone to activate the MobileMoney MasterCard for your next POS transaction. If they do not respond to this SMS, then the card will be turned off for further POS transactions. Else the card will have to be reactivated using OTA procedures. This feature operates at all times on all transactions and provides the customer with a level of confidence in the use of the m-Payment service.

F. Service Charges

An elaborate range of charges are levied onto the customer. The salient features include: No charges for airtime purchases; South African Rand (R) 3 each for services like Payments to another MobileMoney account, Payments to another bank account, and EasyPay bill payment; Withdrawal charges vary between R5 and R10; and Balance enquiries and MasterCard services vary between R1 and R3.

G. Service Load

South African market can be considered as a growing market for m-Payment technology services. Banks are still educating customers as to the benefits of using debit cards at a point of sale terminal. At present, the m-Payment transactions in South African market make up only 7 % of the total debit card transactions. The MTN reports no network overload from the introduction of its service.

H. Market Uptake and Summary Comments

Since the company has not formally disclosed its numbers, there are no authentic indicators as to the real market uptake of the product. However, there have been speculations that the service has been able to garner only about 20,000 customers. In any case, it can be concluded that the service has not been as successful as it was in The Philippines, especially by looking at the fact that the business objectives of MTN Standard Bank Joint Venture are not fully met with at the time of documenting this case.

V. DETERMINANTS OF MARKET ADOPTION

By carefully exploring the two international cases, the researcher could identify a set of six antecedents that govern the market adoption of m-Payment solutions in the business-to-business context. They are respectively Current Payment Relationship, Payment Scenarios, Suitability, Ubiquity, Regulatory and Security Concerns, and Market Segmentation and Targeting; and are discussed below.

A. Current Payment Relationship

It is a well known fact that market players like banks and card acquirers have a dominant hold on the payments market. Saji (2007) noted that the telecommunication industry also inherently nurtures the growth of monopolies. In most markets there is a group of network operators who would try command market shares, and pose high entry barriers to the new entrants. As a result, before entering an industry that straddles two industries (both with high entry barriers), a payment service provider (PSP) in the MC will have to thoroughly analyze the competitive structure of the market. Competition from the mobile network operators (MNOs) must be considered in light that they already have a direct relationship with their customers.

Unlike MNOs, the banks are the incumbents when it comes to the m-Payment services sector. They are the driving force behind two of the more prevalent spending instruments, viz. cheques and credit cards. Facing greater competition and decreasing margins in their core businesses, banks are hungry for newer ways to grow through alternate revenue channels. They see that opportunity in using mobile phones as a personal secure payment terminal. As is the case with e-Commerce transactions, in m-Payment situation too, they are keen to exploit the relationship equity they already hold with their customer base.

B. Payment Scenarios

A popular parameter used to classify the MPSs, as we observed from the cases explored, is the payment scenarios, i.e. based on the setting in which a consumer can make payments (supported by Kruppa, 2001). It is clear that different forces will be at work in different payment scenarios. We categorize the payment settings as Remote Payments and F2F (face2face) payments, and endeavor to identify the unique forces at work in each of these scenarios. Unlike in F2F case, in remote payments, payments are made when the buyer and seller do not physically meet to exchange goods or services. Payments made for settlement of traditional MC services and next generation applications fall under this classification.

C. Suitability

As frontline m-Payment technologies are involved, it is reasonable that technical issues receive a lot of attention in academic literature. However, since insufficient user acceptance has long been an impediment to the successful adoption of any new payment system (Wu and Wang, 2005), it is imperative to consider what factors drive users (the B2B market participants) to adopt new MPS or inhibit them from doing so. The three principal forces that would determine the user uptake, identified through the present study, are Habit (supported by Saji, 2007), Cost Proposition (supported by Wu and Wang, 2005) and Convenience (Saji, 2007).

D. Ubiquity

The telecommunications industry is a classic example of network effects at work. Hence it is perfectly logical that any application leveraging the mobile phone platform should

experience similar network effects. We propose that the MPS will not be successful until they manage the similar levels of ubiquity as the mobile phone. We also propose that even though most MPS have not been successful so far, the positive outlook persists principally because of the ubiquitous reach of the medium required the mobile phone. We could identify from the cases that the required ubiquity has two layers to it, ubiquity of availability and ubiquity of use.

E. Security and Regulatory Concerns

Security is an important prerequisite for any type of monetary exchange. A secure environment in the traditional sense requires four elements to be addressed: Authentication, Confidentiality, Data integrity, and Non-repudiation (Karnouskos and Fraunhofer, 2004). When applied to transactions over mobile networks, security issues regarding device limitations and network immaturity have also to be addressed. With numerous developing mobile payments consortia, issues of standardization and interoperability also have to be addressed. Siau and Shen (2003) claim that the technology trust and vendor trust are equally important in securing customer trust. Building customer trust in MC is a continuous process that extends from initial trust formation to continuous trust development, with mobile technology and vendors as essential framework elements.

F. Market Segmentation and Targeting

It has been observed through the cases that the generic marketing strategies of segmentation and targeting have largely been ignored by the marketers. Majority of the solutions offered an one-size-fits-all product. There was little product customization as observed by Karnouskos and Fraunhofer (2004). As the main focus for deciding the value of payments should be on understanding the market at hand, we propose that the market adoption of m-Payment solutions will only be possible with the support of best fitting generic marketing strategies of segmentation and targeting.

VI. CONCLUSION

The present study enabled the researchers to identify a set of six antecedents to the market adoption of m-Payment solutions in the business-to-business context. By incorporating these antecedents, a conceptual model on business-to-business m-Payment adoption process could well be arrived at. In the next phase of the study, it is therefore proposed to empirically validate this conceptual model in the context of business-to-business market. In nut shell, the research is successful to the extent of generating useful ideas for stimulating and directing further research efforts in the emerging field of market adoption of m-Payment solutions.

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