Payment Operational Models for Mobile Payment System

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Abstract

The payment sector in the financial industry is continually revolving, there are various methods of payment, but the uniqueness of the mobile payment system can’t be ignored. Mobile operators, financial institutions, governments and consumers all recognise the advantages and opportunities this method of payment provides. However, adoption is relatively slow contrary to predictions and relatively uneven in different economies. The mobile payment industry is relatively new and little can be found in recent and current research about the factors that contribute to user adoption in mobile payment transactions. Therefore, this study conducts an analysis of the major mobile payment players and their operation models. After a short review of the emerging literature, we then concentrate on four possible economic models in appropriate economic environments: the operator-centric model, the bank-centric model, the independent service provider model and the collaborative model. Finally, we then analyse the potential of each model and opportunity for the emergence of new models in the mobile payment service environment.

1. Introduction

The mobile phone is one of the best technological advancement of our time and since the introduction of mobile phones in 1980s, more than two of third of the world population has access to a mobile phone (Bourreau & Valletti 2015). Mobile subscribers have continually increased around the world. The International Telecommunications Union (ITU), which is the United Nations specialized agency for information and communication technology (ICT) reports that Mobile-broadband subscriptions have grown more than 20% annually in the last five years and are expected to reach 4.3 billion globally by end 2017 corresponding to 53% of the global population. The report also shows that mobile phone coverage is now near-ubiquitous, with an estimated 95% of the global population
or some seven billion people are living in an area covered by a basic 2G mobile-cellular network (ITU 2017).

The growth of mobile subscriptions, added to revolution in wireless connective has led to dramatic technological advances in mobile devices. Mobile phones have transformed significantly from just their telephony use. They are equipped with functionalities which surpass telephony needs, and which inspire the development of value-added services. These devices which have become common in our daily lives are coupled with internet protocol-based networks which allow various activities to be done on the phone. Activities such as messaging, internet connections, organizers, jukeboxes, mobile internet browsing have become easily accessible with just one mobile device. Mobile phones can also be used for education, entertainment (social and online games), Financial transactions such as mobile-online shopping, mobile banking, mobile broking and mobile payment. Researchers such as (Chandra et al. 2010; Mallat 2007; Schierz et al. 2010) stated that among these services provided by the mobile technology, perhaps using the mobile phone for financial transaction is the most vital.

Mobile payment (thereafter referred to as M-payment) can be referred to as financial business transactions that are operated through a technological device that functions through a mobile network. There isn’t a universally shared and accepted definition of mobile payment. This is because different players and research institutions define mobile payment according to their own institutional perspective. In general, mobile payment can be defined as an exchange process of money in return for goods and services between parties using a mobile device. These devices could be mobile phones, PDAs or computers (Bourreau & Verdier 2010). Below we look at the various definitions of mobile payment. This is to give a wholesome view of the technology.

The Mobile Payment Forum (MPF) has given the following definition for mobile payments. A mobile payment is the transfer of an electronic means of payment from the payer to the payee through the use of an electronic payment instrument, which is a mobile device held by at least one participant, which is not bound to any place and sends and receives information over a wireless link” (MPF, 2002).

Another definition is in a report by Deloitte China Technology where mobile payment was defined as "a form of payment where a user uses mobile device to realize information exchange and complete fund transfer from payer to the
payee for the purpose of payment by way of accessing communication networks or using short-range communication technologies" (Wang & Chou 2015).

However (Gartner Inc. 2015) gave a more detailed definition of m-payment "As a form of payment where transactions are conducted on a mobile phone and using payment instruments that include bank accounts, bankcards and stored value accounts (SVAs) and exclude transactions using carrier billing system for payment, payment via an interactive voice response (IVR) system (excluding IVR used in combination with other mobile channels such as SMS or USSD) or payment via smartphones using plugins to realise POS functions".

The payment sector in the financial industry is continually revolving, there are various methods of payment but the uniqueness of the mobile payment system can't be ignored. The unique advantage of m-payment has open lucrative opportunities to merchants, consumers and service providers. Mobile operators, financial institutions, governments and consumers all recognise the advantages and opportunities this method of payment provides. However, the degree of development and diffusion of m-payments systems has an alternative electronic cash system is below expectation. Many mobile phone users all over the world are sceptical about the benefits and level of security the service provides(Yan & Abdou 2017; Joubert & Belle 2013; Ardossion 2013).

In addition, it has been noted that the level of adoption dramatically differs in various economies. Different countries have selected different technologies and business operational models suited to their own realities. The development of mobile payment is mainly driven by the interaction and competition among the major players in the value chain which include mobile network operators, service providers, financial institutions, vendors etc.

An analysis of relevant literature focused on mobile payment adoption, and the issues affecting its adoption suggest there are limited literature analysing the key players involved in providing the services and their operational models. Therefore, this paper takes a look at analysing the various mobile payment operational models and the major players. This is with the view of highlighting some significant benefit within each of the models. The rest of this paper has been organised as follows. In section number 2 the related work is presented, section number 3 involves a critical analysis and discussion of the mobile payment operation models and finally the conclusion and future work is given in section 4.
2 Related Work

The mobile payment system process is a highly complex system and involves different parties (Dahlberg et al. 2008). It represents another opportunity for the mobile industry and for financial service companies. In order to review the mobile payment operational models, we first look at the various players involved in the system.

2.1 Mobile Payment Players

There are majorly 6 players involved in a mobile payment system. These are consumers, merchants, mobile network operators, device manufacturers, financial institutions and banks, Software and technology providers. (Chandra et al. 2010) categorised this players into three categories which are the:

1. The mobile payment users which involves the customers and merchants.
2. The second category is payment service providers
3. Trusted third party.

Mobile payment users (Customers and merchants) are, of course, one of the major participants in the mobile payment process. (Pousttchi 2003) proposes that mobile payment acceptance by consumers and merchants are the main barrier to enlarged usage and acceptance. Consumers tend to use this application to pay for digital or physical services or goods, in either a digital or a physical context. And a large number of merchants need to accept the system for adoption to be effective. (Arvidsson 2013) note that retailers act in the same way as in traditional payment methods and can forward the payment request to the payment service provider.

The second category which is the payment service provider, is responsible for payment processes via mobile devices. This is a critical component of mobile payment systems thus, many organisations, such as financial institutions, banks and even independent payment vendors, attempt to act as payment service providers (Pousttchi & Wiedemann 2007).

Finally, a trusted third party is required for mobile payments to conduct the authentication of payments and the party that obtains the consumer data is vital. Mobile Network Operators and financial institutions can play this role. The mobile payment process could be viewed as similar to credit-card transaction processes, which also involve different players in the transaction process (Pousttchi & Wiedemann 2007). The mobile payment system provides challenging opportunity for mobile network operators (MNO). This is because the role of an
MNO can vary from simple to very active. They could simply offer mobile payment service providers access to their customers or they could be more active by acting as a mobile payments service provider themselves and offering the services to their Customers directly. Since MNOs already have established sophisticated billing system and have a large customer base, it would be easier to implement the service and the cost would be added to customers phone bills. However, there is competition with financial institutions who are ahead with established sophisticated mobile banking and payment services. Also compared to banks, mobile operators need to gain more knowledge and experience on risk management (Dlodlo & Africa 2015).

The next subsection reviews the payment operational models available.

2.2 Mobile Payment Operational Models

Major players interested in the operation of mobile payment services currently try to take advantage of the mobile phone ease of use, rapid development of mobile phones functionalities and the large diffusion of this technology around the world in respective of age group, gender and location. More recently, different models of mobile payments (m-payments) have emerged all around the world and increased the typology of electronic payments.

Mobile payment solutions may be classified according to the type of payment and based on the technology adopted to implement the solution. There are a variety of combinations of these frameworks and mode of payment, a survey of which would constitute a study in itself. However, these models can be generally classified into Four business models stated below.

a) Operator Dominant Model or Mobile Network Operator Centric Model:

In this model, the mobile network operator (MNO) acts independently to deploy mobile payment applications to NFC-enabled mobile devices (Chang 2014). The MNO is responsible for all the roles across the value chain, i.e. network provider is the acquirer, payment network as well as the issuer. The mobile network operator provides the mobile payment application to the customer. The customer holds a prepaid or a post-paid account with the carrier. When the customer pays through his mobile, the bill is charged to his prepaid or post-paid account. The entire network and interchange is managed by the network operators themselves. The Point of Sale (POS) is also provided to the merchants by the carrier. The payment to the merchant can be made using NFC or Peer-to-Peer SMS.
b) Bank-dominant Model:

In this model, a bank deploys mobile payment applications or devices to customers and ensures merchants have the required point-of-sale acceptance capability (Chang 2014). A bank is the central node of the model, manages the transactions and distributes the property rights. In this model, the financial institutions take the centre stage and is similar to current credit card system. The merchant acquiring banks and issuer banks could be different and the payment network could be managed by yet another financial institution like Visa or MasterCard. The only difference here is that instead of the credit card, the phone is waved in front of the Point of sale (POS) device. This model leverages the existing card payment system. The mobile wallet is issued and provisioned by the banks just like the credit cards.

a) Independent Service Provider Model

The independent service provider model which can also be called peer-to-peer model is a model where an independent peer-to-peer service provider provides secure mobile payments between customers or between customers and merchants (Chang 2014). In this model, a third party, distinct from a financial agent or a telephone operator, plays the role of intermediary between banks, operators, traders and final users. The independent service provider (ISP) manages the distribution of property rights between the operators and the banks, which are in this case less decisional in the coordination process. Internet companies are the ideal candidates to intervene as ISP given their...
previous experience with monetary transfers and the organization of electronic commerce websites.

![Bank Dominant Model](image1)

**Figure 2: Bank Dominant Model. Source: Smart Card Alliance (Baxley 2008)**

An example of this payment model is the services provided by PayPal services from their mobile phones. This new service allows sending or receiving money securely from its own mobile phone or pay online goods or services on websites or marketplaces.

![Independent Service Provider Model](image2)

**Figure 3: Independent service provider model. Source: Smart Card Alliance (Baxley 2008)**

To access this service, the potential user creates for free a PayPal account, under only two conditions: having a mobile phone and a bank account. PayPal accounts can be funded in three different ways: with a bank account, a PayPal
account, or a credit card. Transfers are free if issuer uses his/her bank or PayPal account (Merbecks & Bruck 2012).

b) Collaborative Model

In this model, financial intermediaries and mobile network operators collaborate in the managing tasks and share cooperatively the proprietary rights. This model involves a collaboration between operators, banks and the participation of a third party which creates a link between the two main partners (Baxley 2008). Banks have several million customers and telecommunication operators also have several million customers. If they both collaborate to provide an m-payment solution it is a win-win situation for both industries. In this model, the bank account is linked to the mobile phone number of the customer. When the customer makes an m-payment transaction with a merchant, the bank account of the customer is debited and the value is credited to the merchant account. Revenue paid to all participating partners is derived from fees charged to both merchants and customers and the costs of the investment in the mobile payment system is split between banks, mobile network operators and sometimes the third party providing the service (Merbecks & Bruck 2012).

This model is about collaboration between the carriers and the banks who can distribute the roles of the value chain amongst themselves. The carriers typically are responsible for providing and provisioning m-wallet on the consumer’s hand phone apart from the providing the POS equipment to the merchants.

Figure 4: Collaborative Model. Source: Smart Card Alliance (Baxley 2008)
The roles of acquirer, payment network and issuer remain with the financial institutions; one or more financial institutions may collaborate together in assuming the roles of acquirer, payment network and issuer.

In the following section an analysis of mobile payment models is presented.

3 Analysis and Discussion

Each of the models mentioned above have their advantages and disadvantages and the unique environment of their viability. Below we conduct an analysis of each model.

- Operator Dominant Model

In mobile network dominant model, the MNO acts dependently to deploy mobile payment applications to the customers mobile. Here the MNO takes the initiative and is able to control over the majority of revenue stream. This is extremely beneficial model to the MNO mainly because the operator has sole control over the revenue stream and can also benefit from additional service fees as well as an increased value-added to their customers (Baxley 2008). This can then lead to an increase in customer loyalty and potential reduction in customer turnover. The MNO also has the advantage of owning the technology and particularly the secure element. Another advantage of this model is the ownership of large customer base and use of customer data which can help with the control of user experience thereby giving the MNO a better delivery of service (Wang & Chou 2015).

On the customers side, this model is also beneficial to customers who just have a phone but without a bank account. The MNO tend to be the first candidates to implement mobile payment solutions in an environment where mobile phones are by far numerous than banking accounts (Chaix & Torre 2015). This is common in emerging countries without a banking system sufficiently dense. An example of this m-payment solution can be illustrated by the success of M-Pesai Kenya. A country with a high population of the unbanked. The mobile operator Safaricom launched in Kenya mobile transfer services, called M-Pesa. Users have access to the services such as making deposits and can withdraw money from a network of agents, transfer money to other users and non-users, pay bills, purchase Airtime (Wang & Chou 2015).

In as much as there are advantages with this model, there are still some challenges and concerns from its adoption by merchants, customers and the mobile operator. Challenges such as risk, privacy, fraud and billing/customer...
services issues seems to be a source of concern (Chang 2014). Another challenge to the adoption of these models is the idea that mobile operators would be moving away from their main competencies as a provider of mobile network services. Customers may feel existing financial stakeholders are better suited to handle sensitive financial responsibilities has opposed to their mobile network provider.

- **Bank-dominant Model**

In the bank-dominant model, the bank is the major beneficiary. Banks have a full system of financial intermediations and could provide efficient monetary links among its customers. Banks enjoy advantages such as reduced cash/check handling, potential to include value added advertising to retailers for a fee, potential to reach the unbanked population, and support customers across channels (Merbecks & Bruck 2012). Brand recognition/identity is another major advantage of the bank-dominant model. While the operator-dominant model seems more convenient, customers might trust their banks whom have been handling their financial transactions. Banks maintain a strong position of trust and therefore might have a head start compared with competitors (Baxley 2008).

Although the bank-dominant model has the advantage of a full system of financial intermediations and could provide efficient monetary links among its customers. They must compete or more successfully cooperate with other financial partners and collaborate with mobile operators without any substantial bargaining advantage. In addition, the model is only limited to a population of those with bank accounts. There is also an important question as to whether or not it is necessary to include financial institutions with their added transaction costs (Wang & Chou 2015). This is because, most mobile payment transactions are categorised with micro-payments which require fewer guarantees and low transaction costs. A major difference between the bank dominant model and operator model is that banks face generally a very different environment. They have many competitors and do not hold the technology. Therefore, there is greater risk of security issues with greater potential of hacking the applications/losing mobile phones, paying added cost of installations to multiple operators and OS providers (Chaix & Torre 2011).

- **Independent Service Provider Model**

The independent service provider model is more of an innovation created by new players such as internet service providers. They are able to use software-based payment solutions that are not tied to old structures and technologies and are unrestricted by traditional models. They are able to become the payment
processor themselves and work through banks to execute transactions. They can also team up with mobile operators. The unique advantage of this model is that is able to have access to a wide range of customers which include retailers, bank customers, merchants and mobile phone users.

The independent service provider model seems more logical than the previous models in the sense that they have previous experience with the internet and previous electronic means of financial transactions (Chaix & Torre 2011). However, they would also need some level of cooperation with other players such as banks and mobile operators.

- Collaborative Model

The collaborative model among the previous models discussed seems more feasible and less risky to all stakeholders (Baxley 2008). This model enjoys a wide reach of customers and technology edge to set best standards. The model seems more suited because it allows all players to bring their unique advantages to the table. However, it necessitates a high level of cooperation among players who might not naturally be inclined to make concessions to partners that they might naturally view has competitors (Wang & Chou 2015). Another issue will be how to manage the distribution of property rights and profits among each player. Each player has different incentives and strategies. Sometimes these interests and strategies between different players may be in conflict e.g., the telecommunications network provider would like to maximize revenues through each m-payment transaction whereas customers and merchants would like to minimize costs for each m-payment transaction.

4 Conclusion and Future Work

This paper presents an analysis of the models involved in providing mobile payment services. It raises the problems, pros and cons of the stakeholders involved in the use of this new terminus of payment. The key to a successful mobile payment platform is a better operation model. Presently each model has its pros and cons. The mobile payment service providers need to find a balance between the interests of players involved the service market. However, regardless of the model implemented, some level of collaboration is expected to be necessary, this would allow each business either financial institution, intermediaries, or mobile network providers to focus mainly on what they do best.

There isn't yet a set term of what mobile payment operation models will be because economies of mobile payments system are shifting and continually
Newcomers such as PayPal, Google, Apple and others are turning their sights on mobile payment with advanced software-based approaches running on mobile devices. They are continually testing new models for delivering payments. There is also growing competition among players which is expected to push mobile digital wallets to the next level in terms of adding value to their customers.

The main question is what can traditional and new stakeholders do to ensure they remain in the game? This paper opens many questions about the mobile payment service environment. In future the researcher will be conducting more research within this area.

References

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