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**Author(s):** Shaikh, Aijaz A.; Hanafizadeh, Payam; Karjaluoto, Heikki

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# Mobile Banking and Payment System: A Conceptual Standpoint

Aijaz A. Shaikh, Jyväskylä University School of Business and Economics, University of Jyväskylä, Finland

Payam Hanafizadeh, Department of Industrial Management, Allameh Tabataba'i University, Tehran, Iran

Heikki Karjaluoto, Jyväskylä University School of Business and Economics, University of Jyväskylä, Finland

## ABSTRACT

This study conceptualizes and proposes a well-regulated and designated mobile banking and payment system (MBPS) with the potential to strengthen the banking system, foster the regulatory framework, and to be integrated across various platforms and mobile devices. Unlike other mobile payment systems that lack convenience, scalability, and usability, the proposed MBPS contains several important functionalities and it has the potential to bring together hitherto unconnected industries—banking, Fintech and telecoms—to offer value-added services to their existing and potential customers. The ownership of the MBPS shall remain with the financial services sector including the banking and microfinance institutions. The paper concludes with a discussion on the implications and limitations of the study and proposes future research directions.

## KEYWORDS

Alternate Delivery Channels, Designated Payment System, Innovative Banking, Mobile Banking, Payment Systems, Retail Banking Institutions

## INTRODUCTION

One of the profoundly interesting developments of the past three decades is the electrification, automation, and digitization of business and financial services and the arrival of mobile telephony in emerging and developed economies. Each of these developments appeared when a variety of electronic payment (e-payment) systems and banking channels commonly known as alternative delivery channels or ADCs (Shaikh & Karjaluoto, 2015; 2016) were developed and deployed by banks and microfinance institutions from the early 1990s onwards. According to Abrazhevich (2001), e-payment systems were primarily meant to bring the infrastructure necessary to facilitate payment over the internet using different devices and they are widely considered necessary for further developing e-commerce and e-business. In addition, by eliminating location and time barriers, e-payment systems and ADCs facilitate consumers accessing their banking information remotely, quickly, and conveniently without the need for visiting the bank branch. Mobile and branchless banking services, added latterly in the mobile payment and digital banking portfolio, have revolutionized the banking services landscape (Mortimer et al., 2015) and increased the outreach of retail banking to remote areas. Considering their success and growing consumer interest in the adoption and usage of these e-payment systems and ADCs, non-financial actors (NFAs) including telecoms, mobile network operators, financial technology (Fintech) firms, start-ups and other market participants such as PayPal, Amazon, and Google developing and offering a range of payment services thereby creating increased competition

for diligently regulatory banks. According to Denecker et al. (2014), payments represent a beachhead for changes to the entire banking relationship, and this beachhead is under attack from NFAs.

Given the growing influence of these diverse NFAs or non-bank entrants on the payments landscape, three reasons underline the foundation as well as the purpose and objective of this article as explained below:

First, in the presence of a huge (but diversified and heterogeneous) range of digital banking channels, the banks and regulators are facing several security, privacy, strategic, operational, and oversight challenges (Denecker et al., 2014). The basic premise is that these digital banking channels both motivate the customers to become self-directed and adapt to the online world and demand new controls and risk monitoring systems, especially given their dependence on rapidly changing technology and their ubiquitous nature (International Finance Corporation, 2014). Accordingly, a large and diversified banking portfolio including services and products is likely to have a wider range of harmful effects (Allen et al., 2012) on the performance of the banks and will create unnecessary security risks for them.

The second concern is the existence of a consumer base who are not bank account holders or have any kind of formal relationship with a banking institution. Such consumers are located mainly in developing and emerging markets, and access banking and payment information on portable devices such as cell phones to conduct several different financial transactions. Unfortunately for banks, many of these consumers conduct transactions through mobile payment apps that are developed, managed, and controlled by NFAs. As a result, banking companies, long tightly regulated, are fast losing this consumer base as well as core business segments (i.e., accounts and payments) to NFAs. These developments present several challenges for banks, regulators, and policymakers, especially when NFAs and third party app developers require banks to allow access to confidential consumer data.

The third concern is that these NFAs are operating with fewer regulatory constraints, and most of them lack any significant prior experience in the banking industry (Henniaux, 2014). What is more worrying is that a few of these NFAs are providing mobile financial services in a largely isolated way involving a high risk element. Similarly, there is wide agreement that mobile apps are miniature apps and many of these have not had their codes effectively audited for security flaws prior to their release and use. Consequently, the purpose is to assess and evaluate the potential of mobile payment services and investigate how these services will be affected if unregulated actors provide critical services in the payment system?

Building on these arguments and in order to reconcile these issues, the authors have identified the need to conceptualize a versatile, integrated, and a designated new channel of distribution called 'mobile banking and payment system (MBPS)' primarily meant for regular bank customers or account holders. In particular, this innovative model will strengthen the banking institutions and banking system in general, foster the regulatory framework, and allow integration across various platforms and mobile devices (see Figure 1). Here, the term payment system equates to e-payment system.

Among the frequently-used delivery channels, choosing the mobile option is largely based on the fact that m-banking is considered to be among the latest in a series of recent mobile technological wonders (Shaikh et al., 2015a); it appears to be the fastest-growing digital banking channel worldwide (Wonglimpiyarat, 2014); and the commercial value of this new revenue stream is predicted to be very significant (Barnes & Corbitt, 2003). As to the scope of this conceptual paper, the aim is to provide a high-level overview of different aspects of the conceptualized MBPS.

This article will use the new term MBPS throughout the paper. Practitioners can use it in promotions and advertisements, describing it as a new mode of banking and payment. Consequently, the authors assume that this flagship term can easily be used in bank marketing terminology as a single comprehensive digital banking and payment term.

The section that follows offers a detailed overview of the innovative financial services in an international context (Section 2). Next, the research methodology is outlined (Section 3) followed by the detailed presentation of the conceptual model— MBPS (Section 4). The last section (Section 5) concludes the discussion and suggests valuable implications, limitations, and future research directions.

## **A DETAILED OVERVIEW OF ALTERNATIVE DELIVERY CHANNELS AND INNOVATIVE FINANCIAL SERVICES**

Over the past two decades, banking and payment functions have been virtualized on a massive scale globally (Bons et al., 2012). The shift saw the traditional banking and payment services evolve from branch-oriented to branchless and more recently to become mobile and social media oriented. There have also been advances in delivery channels and the development of new business models. For instance, the development of automated teller machines (ATMs) and recently introduced retail teller machines (RTMs) deployed at various merchant locations has provided greater convenience to consumers accessing financial (e.g., fund transfers) and non-financial (e.g., account balance requests) services and transferring payments. However, the use of ATMs is declining considerably for two major reasons: the proliferation and the increasing usage of mobile devices (Gao et al., 2014) and a growth in the theft of payment card data (Shaikh & Shah, 2012).

Another popular ADC is called internet banking. Internet (or net) banking provides bank customers access to banking information that helps to facilitate various transactions using either a personal computer or laptop anytime and anywhere (Shaikh and Karjaluo, 2016). Broadly speaking, an internet banking allows bank customers to engage in a vast array of innovative online services, such as paying utility bills, checking account information, using check services through bank websites, 24/7 customer support, and the possibility of easy access for disabled people (Hanafizadeh et al., 2014b; Jagannathan et al., 2016).

Some benefits of internet banking to customers as identified by Angelakopoulos and Mihiotis (2011) are the absence of time constraints and geographical limits, cost cutting, the possibility of easy access for disabled people, and an integrated environment for internet banking transactions. Despite these advantages and benefits, internet banking, which early on promised to be the most popular electronic delivery channel (Karjaluo et al., 2002), ended up being a poorly adopted delivery channel (Kuisma et al., 2007).

Several reasons have been offered for the poor adoption of internet banking, also referred to as online banking or virtual banking. One such is that a decline in the use of internet banking services was largely due to changing consumer perceptions of value and growing consumer empowerment, which, according to Pires et al. (2006), allows consumers to choose what they want, when they want, where they want, at their own convenience, and on their own terms. In addition, after the introduction of smart phones by Apple corporation in 2007 (Hall and Anderson, 2009), many financial services firms including banks follow these trends in mobile communications by developing and offering wireless and mobile banking applications easily downloadable onto smartphones for conducting transactions and bank account management (Kurila et al., 2016), which further undermined the need for internet banking services, largely in developed markets. Internet security and users' privacy concerns refuse to go away and further hinder the growth of internet banking. Especially in emerging and developing countries, poor internet connectivity and speed correlate with the low adoption of internet banking services. Similarly, early studies on internet banking suggest that the complexity of using the service deters some consumers from adopting and using it (Laukkanen, 2016; Kuisma et al., 2007).

Other digital banking channels that have transformed the banking culture in different developing and emerging countries are m-banking and social media. A significant body of literature (e.g., Shaikh et al., 2015b; Laukkanen, 2016) has shown that the adoption and the usage of mobile banking (basically meant for bank account holders to access banking services) and its variant branchless banking (allows both bank account holders and non-account holders to access banking services and

it is largely meant for the unbanked segment of society) have recorded a massive growth globally. On the other hand, social network banking, a term introduced by Bohlin et al. (in press), offers largely non-financial services to consumers on popular social media platforms such as Facebook, Twitter, YouTube and so forth.

To summarize, the commercial potential and a profound growth and usage of mobile-based financial services has both opened new business opportunities for the banking companies and provided greater convenience of anytime, anywhere banking to a demographically dispersed population. Consequently, any future technology development that does not account for mobile technology is unlikely to be popular with the consumer.

## **RESEARCH METHODOLOGY**

In consideration of the vastness of published literature on MBPS, it is important that the literature should be carefully scrutinized. Here, a watchful approach was adopted involving all the authors to identify, select, shortlist, and download the most relevant and appropriate literature. In addition, one of the authors has an enviable track record of working with the banking industry especially in designing policy documents concerning different aspects of digital banking and payment systems.

The research methodology used to gather and interpret the data, to support the arguments, and to reach a decisive conclusion, is largely based on secondary and non-numeric sources. According to Sørensen et al. (1996), secondary data in research are data that have not been collected with a specific research purpose. Prior research has discussed several benefits to using secondary data (Heaton, 2003) and the importance of using secondary data for analysis purposes has been established in the literature (e.g., Smith, 2008). For instance, Cowton (1998, p.432) concluded that “secondary data may have attributes which render them highly attractive when compared to interview and questionnaire results.” Nonetheless, the disadvantages of secondary data relate to the fact that their selection, quality, and the methods of their collection, are not under the control of the researcher, and that they are sometimes hard to validate (Sørensen et al., 1996).

The authors utilize a vast contemporary, historical, and original set of secondary data and information consisting of policy and regulatory documents, archives, and popular market surveys published by the banks, central banks, and advisory firms such as Forrester Research to propose the MBPS, draft the findings, and draw conclusions. In addition, a cursory review of the literature consisting of the scientific publication and conference proceedings was also conducted to understand the banking and payment models developed and proposed previously.

## **MOBILE BANKING & PAYMENT SYSTEM (MBPS) – CONCEPTUALIZATION AND DEFINITION**

This section is divided into different sub-sections with an underlying objective of providing a detailed overview of the MBPS.

A great deal of understanding about the e-payment system (and its variant mobile payment system) is required to understand the core concept of the MBPS. Prior research (e.g., Bezovski, 2016) has considered an e-payment system the backbone of e-commerce business, and defined it as an online or e-payment service that utilizes information and communication technologies. The Financial Services (Banking Reform) Act 2013 of the United Kingdom has defined the term payment system as “a system which is operated by one or more persons or entities in the course of business for the purpose of enabling consumers to make transfers of funds, and includes a system which is designed to facilitate the transfer of funds using another payment system.” Compared with traditional payment methods such as pay-by-check, pay-by-phone, or wire transfer, an online payment system is generally considered more convenient and flexible for customers and banks alike (He & Mykytyn, 2009). Moreover, for many companies including banks, e-payments have become one of the most critical issues in their successful business and financial services (Kim et al., 2010).



Prominent and frequently-used e-payment systems include payment cards (such as debit, credit, and prepaid debit cards); E-wallets; Mobile payments; Loyalty and Smart cards and so forth. Considering their scope and usage, these payment systems have been divided into account-based and electronic currency systems. An account-based payment system allows consumers to make payments using their regular bank account, while an electronic currency payment system allows the consumers to make payments using electronic or virtual currency (Bezovski, 2016). The proposed MBPS follows the account-based payment system mechanism because the growing security issues largely seen in the electronic currency system.

In light of the many past mobile payment system failures (Ondrus & Pigneur, 2009) as discussed in the following paragraphs, there is a real need to analyze and understand the requirements to succeed in this market ruled by uncertainty and lightly regulated NFAs. Here, considering the growing influence of NFAs, ranging from telecom companies to small and agile technology players, start-ups, and software houses that are defining the standards for digital banking (Denecker et al., 2014), a basic question arises of 'who will then own the customer?'

During the last decade, prior research in the broader area of m-banking and payment systems has conceptualized and proposed some versatile mobile-based payment systems. Strikingly, some of these efforts failed to achieve the expected results and others proposed mobile payment systems with limited functionality; mobile payment systems that further strengthen the NFAs or service providers; mobile payment systems that pay little attention to the regulatory issues, and the prior research has also on occasion overlooked the role of the banking institutions in these conceptualized payment systems.

More precisely, Saxena et al. (2005) proposed a mobile-to-mobile payment system supported by Europay, MasterCard, and VISA (EMV) with thin functionality (payments are linked to only debit/credit accounts in a bank to pay at a merchant that should have an online EMV capable terminal). The proposed system had limited scalability and diversity of the services (it was designed only to be used on cell phones), and did not consider regulatory requirements or incorporating a near field communication (NFC) capability. Considering its significance and its usage in the proposed MBPS model, a cursory overview of NFC technology is provided in the following section.

Similar issues afflict another conceptualized mobile payment system based on a real-time quick response (or QR) bar codes (Ma et al., 2015) primarily meant to support buying and selling transactions on all goods and products with QR barcode identification. According to Liu et al. (2008), the QR code, an automated data collection method, is developed in Japan by Denso Corporation during early 1990s and later it is recognized as standard. Conceptualizing a general packet radio service (GPRS) mobile payment system based on radio frequency identification (RFID) technology, Liu et al. (2006) argued that their cell-phone based proposed payment system could be developed and managed by a telecom service provider to provide diverse mobile payment services. Considering their nature, RFID tags are small, wireless devices that help identify objects and people (Juels, 2006).

Although there is no any globally accepted mobile payment system, our premise is that without the ownership or co-operation of any banking institute, the development and deployment of any payment system should be considered unsafe, to have a high probability of failure, and to jeopardize the interest of the consumer.

## **MBPS and NFC Technology**

NFC facilitates communication between various mobile devices, which could greatly contribute to the democratization of mobile computing (Ondrus & Pigneur, 2007) as well as increased scalability. In addition, different, innovative ways have been identified whereby contactless or NFC-equipped devices could connect financial institutions, merchants, and retailers with their customers (Tan et al., 2014). NFC-embedded ATMs allow cash withdrawal and fund transfer facilities using any portable device as a form of access code. Owing to its necessity and convenience, NFC-enabled mobile payments have reached the mass market in Japan (De Reuver et al., 2014), Korea (i.e., Hana SK Card), Hong Kong (i.e., Octopus Card) and Singapore (i.e., Smart Card and EZ-link). According to IDTechEx (2014), over 200 million NFC-enabled mobile phones were recently shipped worldwide.

NFC technology is widely considered as a convenient, safe and fast payment system which allows low value transactions at Point-of-Sale terminals such as kiosks or fast-food restaurants. In addition, a related stream of research (e.g., Halaweh and Al Qaisi, 2016; Ondrus and Pigneur, 2009) has considered NFC as one of the emerging technologies that has a great potential, making it convenient to process payments through mobile phones. Ondrus and Pigneur (2007) conducted a detailed systematic analysis and present NFC technology as a trendy but fundamental technology to facilitate the uptake of mobile payment systems. Consequently, any new scheme that does not support NFC payments seems to be incomplete and inefficient.

### **Differences Between MBPS and M-Wallets**

There is potential for considerable confusion around the terms *MBPS* and *m-wallet*, and it is therefore important to distinguish them to establish the need to conceptualize the MBPS. The m-wallet was recently added to the digital banking portfolio (Gruenberg and Thompson, 2012) and allows users to pre-load payment account information on their mobile devices, such as smartphones, and to choose payment options. Consequently, the underlying assumption of creating an m-wallet was to allow non-bank account holders to conduct m-payment transactions. Some scientific and anecdotal evidence suggests that although m-wallets provide greater convenience to the consumers, their development has been erratic (e.g., Sahut, 2006), with little usefulness or trust (e.g., Shaw, 2015). In contrast, the MBPS will be initiated under a set of pre-defined rules and regulations; it is meant for regular account holders; and its ownership lies within a banking institute. The banking institutions, therefore, will continue to play a decisive role in facilitating an MBPS in collaboration with NFAs.

### **The Conceptualization of MBPS**

The objective to conceptualize and propose the MBPS follows consideration of the proliferation of digital banking channels and entry to new aggressive players and social networks, along with growing safety, security and regulatory concerns. The MBPS, as explained in the succeeding paragraphs, can be integrated seamlessly into the digital banking portfolio controlled and managed by the banking companies.

The remarkable penetration rates of portable devices, combined with the hedonic nature of mobile phones and tablets (Lai et al., 2012) are hard to ignore, and it is difficult to imagine today's "always on" consumers adopting any future development in the broader field of electronic business that does not account for mobile devices. Consequently, leveraging portable devices as well as the contactless, proximity or NFC technology to access financial information, conduct various transactions and perform a variety of financial and non-financial transactions is at the core of the MBPS. Incorporating the NFC inherent tap & pay payment mechanism, the MBPS will allow its users to access proximity and remote banking options using a downloadable banking and payment application onto a NFC-enabled mobile device such as a smartphone or tablet.

This conceptualized MBPS is primarily meant for regular bank customers. As reported by Accenture (2013) in one of its extensive surveys involving 30,900 mobile consumers in 26 countries, the banks are the most trusted partner in terms of protecting consumers' personal information (57% of the survey's participants trust banks), while social networks such as Facebook appear to be the least trusted organizations (4% of the survey's participants trust social networks). These results clearly suggest that the respondents favor banks as one of their trusted banking services providers.

The MBPS is multi-faceted, in that it has many different features that represent the coverage and scope of the MBPS. Those features are presented in Figure 1 below, which also illustrates that the MBPS is a convergence service (Lee et al., 2015) that brings together hitherto unconnected industries—banking and telecoms—to offer value-added services to their respective customers. The mobile telecommunication industry has significantly extended its boundaries since the early 1990s (Mazzoni et al., 2007) and now plays a crucial role and provides the necessary mobile infrastructure, the ownership of MBPS will however remain with banking or microfinance institutions holding a banking license and with the appropriate infrastructure. The basic premise is that bank companies



ensure oversight and regulatory compliance with national financial regulations and policy (Nyaga, 2014) and bank companies facilitate foreign exchange, clearing and settlement services (Jenkins, 2008) in the most secure and efficient way.

Nonetheless, the telecom sector will retain the role of facilitator or business partner, depending upon the nature of regulatory framework governing how cross-industry participants can take advantage of technological innovations.

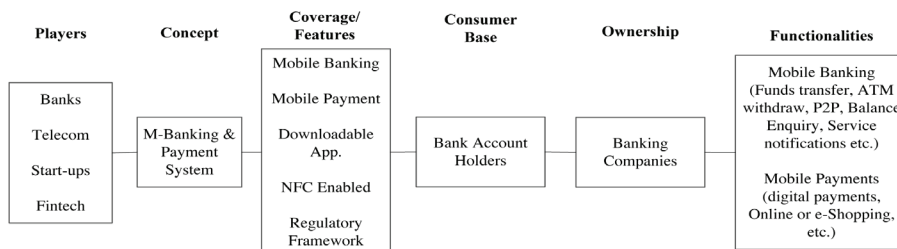
In addition, a strong emphasis is placed on the development and deployment of an integrated digital platform for the MBPS that can serve as a master repository across different products and services. The obvious consideration for banks and marketers, argued by Forrester Research (2012), for the development and deployment of an integrated digital platform is extensive functionality, security and the convenience of different customer segments, and the capability for seamless use on various portable devices such as smartphones and tablets. This integrated platform will gradually reduce, and in a few cases may eliminate, the need for the use of multiple applications and procedures supporting various channels (such as ATMs, POS, the internet and so forth), devices (smart phones and tablets) and payment cards (such as the ATM, Debit, Credit and so forth). The MBPS can easily be hosted on a smart phone or tablet using a dedicated, secure and downloadable user interface and provide a variety of traditional and innovative mobile banking, payment and transfer services to bank customers. These innovative MBPS features will increase customer outreach, providing customers with enhanced security and convenience.

Finally, the MBPS is NFC-enabled. Prior research (e.g., Leong et al., 2013) has recognized NFC payment technology as the future of mobile payments and its usage as critical (Tan et al., 2014). NFC has been considered an emerging payment technology and its presence in the payment ecosystem cannot be avoided. Considering these arguments and predictions, developing any banking product in future without accommodating NFC technology would be unwise.

### MBPS and the Regulatory Environment

In the case of the MBPS, the objective is to streamline the regulations that are scattered between different digital banking channels and products into a more coherent set of prudent regulations. Consequently, the purpose is to create a common regulatory framework for both established players, such as banks, and emerging institutions, such as telecoms, Fintech firms, and start-ups. The benefits will be immense for the industry, regulators, policy makers, and service providers since a comprehensive and consolidated policy framework on the MBPS will create a level playing field for all stakeholders, including banking and NFAs. It will also effectively increase the regulatory and oversight mechanism and reduce the multiple rounds of customer due diligence (CDD) and know-your-customer (KYC) exercises, until now conducted separately when the consumer signs in or applies for bank accounts, credit cards, prepaid debit cards, and so forth.

Figure 1. Scope and coverage of MBPS



Unlike CDD, KYC is one of the critical regulatory requirements and requires verifying the identity of both new and existing customers who banks deal with. Without these controls, banks can be exposed to reputational, operational, and legal risks, which can result in significant financial cost (Bank for International Settlement, 2001). In summary, the integrated functionality of the MBPS (previously scattered across various domains, such as branchless (or mobile) banking, ATMs, POS, and payment cards) will help policy makers, regulators, practitioners, banks, and other industry stakeholders prepare future policies, procedures, and regulations. The MBPS will, therefore, streamline CDD and KYC controls.

### **MBPS as a Designated Payment or Technological System**

The designation criteria for payment systems will have a fundamental impact on the structure and process of the MBPS and provide several benefits to the retail banking institutions, NFAs and others. These payment systems designation criteria have somewhat surprisingly been overlooked by the mainstream research.

After the explosion of financial applications, products, and services, in addition to the establishment of several non-bank organizations providing settlement and electronic transaction routing services to banking companies and their consumers, the regulators have begun to understand the necessity of supervising and regulating payment systems. Consequently, a separate set of laws and regulations on designating a payment system as a designated payment system were enacted in many countries including the UK (Payment systems regulators, 2014); Europe (Systemically important payment systems, 2014); Singapore (Payment Systems Oversight Act, 2007); Pakistan (Payment systems and electronic fund transfer act, 2007); Australia (Payment systems regulation act, 1998); Malaysia (The Payment systems act, 2003) and so forth.

In a few cases, prior research (e.g., M'Chirgui, 2005) used the term technological systems instead of the term payment systems. In its current manifestation, the payment system laws entail the entities developing, distributing, and offering innovative banking, payments and even fund transfer services and products being required to be 'designated' under the payment systems regulations and their 'designation' as a designated payment system is obligatory.

The need for a designated payment system and its significance in bringing stability to the financial markets have been established in prior research as well as in popular market and regulatory reports. For instance, one of the major advantages associated with the designation criteria is that a designated payment system will bring the payment system players under the scope of regulation and thereby protect the interest of the consumers as well as all the parties in the system. In addition, Akhtar (2007) argues that a designated payment system provides standards for protection of the consumer and determines the respective rights and liabilities of the financial institutions and other service providers (commonly known as third parties), their customers, and other participants. Here Asokan et al. (1997) found that in addition to flexibility of use, a properly designed e-payment system can provide better security than traditional means of payment. At the very least, designation criteria require that each player in the value chain has a clear financial incentive as well as a responsibility to participate in and actively promote the service (Mas, 2009). Consequently, the banks, telecoms, and other industry stakeholders involved in designing, implementing and maintaining MBPS services and applications should operate under a well-defined regulatory framework, supervised by the regulatory authorities—commonly, but not exclusively, the central banks and telecommunication authorities—to protect the interests of consumers, substantially reducing systemic and operational risks, promoting financial system stability and increasing consumer trust.

### **CONCLUSION**

This paper examines the current state of innovative banking systems, products and services, and helps move the existing electronic banking environment toward a more coherent and sustainable mobile banking paradigm.

The authors have analyzed the contemporary and historical literature, laws, regulations and policy documents on digital banking, popular market reports and the regulatory framework, highlighting significant gaps and discussing the operational and regulatory challenges faced by the retail banking institutions in managing a huge, diverse, and heterogeneous array of delivery channels consisting of different products and services. Prior to the financial crises 2007–2010, NFAs were operating as niche providers concentrating on a select range of products, and operating through partnerships with existing banks (Worthington and Welch, 2011). However, learning from the financial crisis experience, NFAs started developing into full-service retail banking products and service providers but without any regulatory or oversight framework. The emergence of these new players in the mobile payment market makes it evident that banks and credit card companies need to take an active role in this revolution (Gupta, 2013). As clearly stipulated by Worthington and Welch (2011), if the financial crisis created new opportunities, it also introduced new threats.

This paper has conceptualized and proposed a new mobile banking system it calls the MBPS. The MBPS is a multi-functional mobile system allowing various banking and payment transactions using a single downloadable fat application on any NFC-enabled mobile device such as a smartphone or tablet. Similarly, leveraging mobile and other portable devices for accessing financial information, conducting financial and non-financial transactions and performing a variety of payments is at the core of the MBPS.

Dahlberg et al., (2008) note how the m-payment products, services, and markets are currently in transition, and have a history of numerous failed innovations, and a future of promising but as yet uncertain possibilities. This new mobile banking system has been conceived and proposed considering the uncertainties predicted in the m-payment market, the emergence of new players and NFAs, as well as an inevitable growth seen in the adoption and usage of mobile devices such as smartphones and tablets globally. For example, Juniper Research (2013) finds that over 1.75 billion mobile phone users will have used their devices for banking purposes by the end of 2019, compared to 800 million this year. In light of the huge growth and potential that has been predicted in the adoption and usage of mobile devices for banking purposes in the not too distant future, mobile will outperform other digital banking channels and products.

## **IMPLICATIONS, LIMITATIONS AND FUTURE RESEARCH DIRECTIONS**

Our arguments on the MBPS offer some contributions to theory and practice. This study advances the literature on m-banking by providing new insights and a comprehensive understanding of payment systems, digital banking, and designation criteria. Although previous research has identified several antecedents and consequences of behavioral intention to adopt and use m-banking services (e.g., Hanafizadeh et al., 2014a) in developed and developing countries, our research extends these lines of study by presenting a new mobile payment system model; one capable of empowering financial institutions and the regulatory authorities to address growing privacy and security issues and protect the consumer interest, which should encourage its adoption and usage across several markets. In terms of practical implications, findings from this study show that commercial banks have not fully realized the implications of the payment systems criteria, despite the presence of a necessary regulatory framework on ‘designated payment systems’. The industry, that is, banks, telecoms and so forth, therefore, needs to consider the designation criteria as critical when offering mobile payment services to a widely dispersed population. After all, a safe and efficient payment system is critical to the effective functioning of the financial systems and to build consumer trust (European Central Bank, 2010).

Similarly, the power of partnerships and outsourcing can make visible differences. The MBPS does not entail banks necessarily developing, deploying and managing the system by themselves; rather a broader understanding is required to fully understand its implications. The authors’ perception is that it is very unlikely that the development and deployment of the MBPS would be possible without collaboration with other market participants, especially given that banks usually struggle to develop

and deploy innovative technological platforms to their customers at the pace at which customers adopt these new technologies. As a result, banks are at a remarkable disadvantage and risk losing their customers as more agile intermediaries and third parties capture the benefit of the innovation (King, 2013, p.29). In the same vein, a strong convergence mechanism (where the companies from different industries collaborate on the development and deployment of a product or service) will facilitate the development of an MBPS where retail banks, microfinance institutions, telecoms, and payment associations such as VISA, MasterCard, and Union Pay can collaborate and work under a well-defined and properly regulated mechanism to provide value-added services to new and existing consumers. It is, therefore, paramount that the laws, regulations, and market standards pertaining to mobile banking and payment services should be holistic and designed with a coordinated approach and an underlying assumption that they will strengthen the regulatory framework, allowing third parties to develop superior solutions, and facilitate new payment providers so as to encourage competition and create greater choice, options and convenience for consumers.

Despite our careful study design, it is not without limitations. First and the foremost is the validation of our conceptual model. As per an agreed protocol, after constructing and suggesting a conceptual model, such as MBPS, the research needs to validate the model with the users who have either used or intend to use a mobile and payment system. According to Shanks et al. (2003), failure to validate the model might lead to subsequent system design, implementation and usage activities failure. Moreover, if these defects are not discovered and corrected until late in the development process, they are often costly to correct. Validating a conceptual model is thus critical to successful system development and deployment (Shanks et al., 2003). Future research validating the conceptualized and proposed MBPS with users, preferably in a developed country setting where the infrastructure supporting e-payment systems has been in place (Kim et al., 2010) for a few decades, and which features a large consumer base using different e-payment systems should be encouraged.

Second, although the authors made considerable efforts to conceptualize a versatile and designated mobile banking model, our conceptualization is not perfect. In particular, the MBPS is meant to benefit regular account holders and endeavors to serve the community with banking facility in different countries. A more holistic approach may require future research to cover all the segments of consumers, especially the unbanked and under-banked rural and urban groups. In addition, the banking companies and other stakeholders investigating the MBPS must understand that consumers' usually value the reliability of such digital services and that trust in services is built and increased via learning and awareness processes (Arvidsson, 2014). It implies that consumers' increasing awareness and their learning to use the service will probably increase the level of trust.

Third, we have deliberately omitted the financial inclusion programs from the scope of the MBPS. Financial inclusion programs have been initiated in several emerging and developing countries following research findings indicating their importance to both government and society (e.g., Koku, 2015). Similarly, mobile payment systems have been identified as a significant driver contributing to the development and economic growth in developing and emerging countries when compared to other e-payment systems (Mwafise and Stapleton, 2012). Future research should examine these dimensions when putting forward any new MBPS.

Forth, this study has postulated that designation criteria provided several benefits to the banks, service providers and consumers, such as allowing better service development and better customer relationship management by way of increasing customer satisfaction and trust. However, given the structure of our conceptualization, we are unable to justify the designation criteria for the MBPS. That is largely due to the lack of research on designated payment systems and their benefits to the banking industry and other stakeholders. Prior research (e.g., Liébana-Cabanillas et al., 2014; Su et al., 2013) has, however, considered mobile payment systems and examined the antecedents of adoption, but the designation of such mobile payment systems as a designated payment system is missing. We encourage future studies to unpack the true benefits of 'designating' and its benefit to different stakeholders, enhancing the supervisory portfolio and protecting the interests of the consumer. After all, banks may not be able to sustain another round of financial crises in the future.

## REFERENCES

- Abrazhevich, D. (2001, September). Classification and characteristics of electronic payment systems. *Proceedings of the International Conference on Electronic Commerce and Web Technologies* (pp. 81-90). Springer Berlin Heidelberg. doi:10.1007/3-540-44700-8\_8
- Accenture. (2013). Mobile Web Watch 2013: The new persuaders. Retrieved from <http://www.accenture.com/SiteCollectionDocuments/PDF/Technology/accenture-mobile-web-watch-2013-survey-new-persuaders.pdf>
- Akhtar, S. (2007). Building inclusive financial system in Pakistan. Retrieved from [www.sbp.org.pk/about/.../Draft-Agriculture-PRs-18-04-05.pdf](http://www.sbp.org.pk/about/.../Draft-Agriculture-PRs-18-04-05.pdf)
- Allen, F., Demircuc-Kunt, A., Klapper, L., & Peria, M. S. M. (2012). The Foundations of Financial Inclusion. *World Bank Policy Research Working Paper*.
- Angelakopoulos, G., & Mihiotis, A. (2011). E-banking: Challenges and opportunities in the Greek banking sector. *Electronic Commerce Research*, 11(3), 297–319. doi:10.1007/s10660-011-9076-2
- Arvidsson, N. (2014). Consumer attitudes on mobile payment services—results from a proof of concept test. *International Journal of Bank Marketing*, 32(2), 150–170. doi:10.1108/IJBM-05-2013-0048
- Asokan, N., Janson, P. A., Steiner, M., & Waidner, M. (1997). The state of the art in electronic payment systems. *Computer*, 30(9), 28–35. doi:10.1109/2.612244
- Bank for International Settlement. (2001). Retrieved from <http://www.bis.org/publ/bcbs85.pdf>
- Barnes, S. J., & Corbitt, B. (2003). Mobile banking: Concept and potential. *International Journal of Mobile Communications*, 1(3), 273–288. doi:10.1504/IJMC.2003.003494
- Bezovski, Z. (2016). The Future of the Mobile Payment as Electronic Payment System. *European Journal of Business and Management*, 8(8), 127–132.
- Bohlin, E., Shaik, A.A., & Hanafizadeh, P. (in press). Banking on social networking sites – A case study of 100 top-notch global banks (working paper).
- Bons, R. W., Alt, R., Lee, H. G., & Weber, B. (2012). Banking in the Internet and mobile era. *Electronic Markets*, 22(4), 197–202. doi:10.1007/s12525-012-0110-6
- Cowton, C. J. (1998). The use of secondary data in business ethics research. *Journal of Business Ethics*, 17(4), 423–434. doi:10.1023/A:1005730825103
- De Reuver, M., Verschuur, E., Nikayin, F., Cerpa, N., & Bouwman, H. (2014). Collective action for mobile payment platforms: A case study on collaboration issues between banks and telecom operators. *Electronic Commerce Research and Applications*, 14(5), 331–344. doi:10.1016/j.elerap.2014.08.004
- Denecker, O., Gulati, S., & Niederkorn, M. (2014). The digital battle that banks must win. Retrieved from [http://www.mckinsey.com/insights/financial\\_services/the\\_digital\\_battle\\_that\\_banks\\_must\\_win](http://www.mckinsey.com/insights/financial_services/the_digital_battle_that_banks_must_win)
- Dahlberg, T., Mallat, N., Ondrus, J., & Zmijewska, A. (2008). Past, present and future of mobile payments research: A literature review. *Electronic Commerce Research and Applications*, 7(2), 165–181. doi:10.1016/j.elerap.2007.02.001
- European Central Bank. (2010). The payment system. Retrieved from <https://www.ecb.europa.eu/pub/pdf/other/paymentsystem201009en.pdf>
- Financial Services (Banking Reform) Act. (2013). Retrieved from [http://www.legislation.gov.uk/ukpga/2013/33/pdfs/ukpga\\_20130033\\_en.pdf](http://www.legislation.gov.uk/ukpga/2013/33/pdfs/ukpga_20130033_en.pdf)
- Forrester Research. (2012). The state of mobile banking 2012. Retrieved from <http://interact.f5.com/rs/f5/images/Forrester%20Report%20The%20State%20of%20Mobile%20Banking%202012.pdf>
- Gao, S., Krogstie, J., Chen, Z., & Zhou, W. (2014). Lifestyles and mobile services adoption in China. *International Journal of E-Business Research*, 10(3), 36–53. doi:10.4018/ijebr.2014070103



- Gruenberg, M. J., & Thompson, S. L. (2012). Retrieved from <https://www.fdic.gov/regulations/examinations/supervisory/insights/siwin12/SIwinter12.pdf>
- Gupta, S. (2013). The mobile banking and payment revolution. *European Finance Review*, 2, 3–6.
- Halaweh, M., & Al Qaisi, H. (2016). Adoption of Near Field Communication (NFC) for Mobile Payments in the UAE: A Merchants Perspective. *International Journal of E-Business Research*, 12(4), 38–56. doi:10.4018/IJEBR.2016100103
- Hall, S. P., & Anderson, E. (2009). Operating systems for mobile computing. *Journal of Computing Sciences in Colleges*, 25(2), 64–71.
- Hanafizadeh, P., Behboudi, M., Koshksaray, A. A., & Tabar, M. J. S. (2014a). Mobile-banking adoption by Iranian bank clients. *Telematics and Informatics*, 31(1), 62–78. doi:10.1016/j.tele.2012.11.001
- Hanafizadeh, P., Keating, B. W., & Khedmatgozar, H. R. (2014b). A systematic review of Internet banking adoption. *Telematics and Informatics*, 31(3), 492–510. doi:10.1016/j.tele.2013.04.003
- He, F., & Mykytyn, P. P. (2007). Decision Factors for the Adoption of an Online Payment System by Customers. *International Journal of E-Business Research*, 3(4), 1–32. doi:10.4018/jebr.2007100101
- Heaton, J. A. N. E. T. (2003). *Secondary data analysis. The AZ of Social Research* (pp. 285–288). London: Sage.
- Henniaux, E. (2014). Mobile Banking Strategy-What are the key success factors? Retrieved from <http://www.pwc.lu/en/press-articles/2014/mobile-banking-strategy-what-are-the-key-success-factors.jhtml>
- IDTechEx. (2014). Near Field Communication (NFC)-2014-2024 Mobile phone and other NFC: market forecasts, technology, players. Retrieved from <http://www.idtechex.com/research/reports/near-field-communication-nfc-2014-2024-000363.asp>
- International Finance Corporation. (2014). Alternative delivery channels and technology. Retrieved from <http://www.ifc.org/wps/wcm/connect/5d99c500477262e89844fd299ede9589/ADC+Handbook+-+2014.pdf?MOD=AJPERES>
- Jagannathan, V., Balasubramanian, S., & Natarajan, T. (2016). A modified approach for information systems success in the context of internet banking using structural equation modelling with r: an empirical study from India. *International Journal of E-Business Research*, 12(3), 26–43. doi:10.4018/IJEBR.2016070103
- Jenkins, B. (2008). *Developing Mobile Money Ecosystems*. Washington, DC: IFC and the Harvard Kennedy School.
- Juels, A. (2006). RFID security and privacy: A research survey. *IEEE Journal on Selected Areas in Communications*, 24(2), 381–394. doi:10.1109/JSAC.2005.861395
- Juniper Research. (2013). Mobile banking: handset & tablet market strategies 2013-2017. Retrieved from <http://www.juniperresearch.com/viewpressrelease.php?pr=356>
- Karjaluoto, H., Mattila, M., & Pento, T. (2002). Factors underlying attitude formation towards online banking in Finland. *International Journal of Bank Marketing*, 20(6), 261–272. doi:10.1108/02652320210446724
- Kim, C., Tao, W., Shin, N., & Kim, K. S. (2010). An empirical study of customers perceptions of security and trust in e-payment systems. *Electronic Commerce Research and Applications*, 9(1), 84–95. doi:10.1016/j.elerap.2009.04.014
- King, B. (2013). *BANK 3.0: Why banking is no longer somewhere you go, but something you do*. Singapore: Marshall Cavendish.
- Koku, P. S. (2015). Financial exclusion of the poor: A literature review. *International Journal of Bank Marketing*, 33(5), 1–26. doi:10.1108/IJBM-09-2014-0134
- Kuisma, T., Laukkanen, T., & Hiltunen, M. (2007). Mapping the reasons for resistance to Internet banking: A means-end approach. *International Journal of Information Management*, 27(2), 75–85. doi:10.1016/j.ijinfomgt.2006.08.006
- Kurila, J., Lazuras, L., & Ketikidis, P. H. (2016). Message framing and acceptance of branchless banking technology. *Electronic Commerce Research and Applications*, 17, 12–18. doi:10.1016/j.elerap.2016.02.001



- Lai, J. Y., Debbarma, S., & Ulhas, K. R. (2012). An empirical study of consumer switching behaviour towards mobile shopping: A Push–Pull–Mooring model. *International Journal of Mobile Communications*, 10(4), 386–404. doi:10.1504/IJMC.2012.048137
- Laukkanen, T. (2016). Consumer adoption versus rejection decisions in seemingly similar service innovations: The case of the Internet and mobile banking. *Journal of Business Research*, 69(7), 2432–2439. doi:10.1016/j.jbusres.2016.01.013
- Lee, H., Harindranath, G., Oh, S., & Kim, D. J. (2015). Provision of mobile banking services from an actor–network perspective: Implications for convergence and standardization. *Technological Forecasting and Social Change*, 90, 551–561. doi:10.1016/j.techfore.2014.02.007
- Leong, L. Y., Hew, T. S., Tan, G. W. H., & Ooi, K. B. (2013). Predicting the determinants of the NFC-enabled mobile credit card acceptance: A neural networks approach. *Expert Systems with Applications*, 40(14), 5604–5620. doi:10.1016/j.eswa.2013.04.018
- Liébana-Cabanillas, F., Sánchez-Fernández, J., & Muñoz-Leiva, F. (2014). Antecedents of the adoption of the new mobile payment systems: The moderating effect of age. *Computers in Human Behavior*, 35, 464–478. doi:10.1016/j.chb.2014.03.022
- Liu, W., Zhao, C., Zhong, W., Zhou, Z., Zhao, F., Li, X., . . . Kwak, K. (2006, November). The GPRS mobile payment system based on RFID. *Proceedings of the International Conference on Communication Technology ICCT '06* (pp. 1-4). IEEE. doi:10.1109/ICCT.2006.342034
- Liu, Y., Yang, J., & Liu, M. (2008, July). Recognition of QR code with mobile phones. *Proceedings of the 2008 Chinese Control and Decision Conference* (pp. 203-206). IEEE. doi:10.1109/CCDC.2008.4597299
- Ma, T., Zhang, H., Qian, J., Hu, X., & Tian, Y. (2015, January). The Design and Implementation of an Innovative Mobile Payment System Based on QR Bar Code. *Proceedings of the 2015 International Conference on Network and Information Systems for Computers* (pp. 435-440), IEEE. doi:10.1109/ICNISC.2015.35
- Mas, I. (2009). The economics of branchless banking. *Innovations*, 4(2), 57–75. doi:10.1162/itgg.2009.4.2.57
- Mazzoni, C., Castaldi, L., & Addeo, F. (2007). Consumer behavior in the Italian mobile telecommunication market. *Telecommunications Policy*, 31(10), 632–647. doi:10.1016/j.telpol.2007.07.009
- MChirgui, Z. (2005). Smart card industry: A technological system. *Technovation*, 25(8), 929–938. doi:10.1016/j.technovation.2004.02.004
- Mortimer, G., Neale, L., Hasan, S. F. E., & Dunphy, B. (2015). Investigating the factors influencing the adoption of m-banking: A cross cultural study. *International Journal of Bank Marketing*, 33(4), 442–456. doi:10.1108/IJBM-07-2014-0100
- Mwafise, A. M., & Stapleton, L. (2012). Determinants of User Adoption of Mobile Electronic Payment Systems for Microfinance Institutions in Developing Countries: Case Study Cameroon. *IFAC Proceedings Volumes*, 45(10), 38-43.
- Nyaga, J. K. (2014). Mobile banking services in the East African community (EAC): Challenges to the existing legislative and regulatory frameworks. *Journal of Information Policy*, 4, 270–295. doi:10.5325/jinfopoli.4.2014.0270
- Ondrus, J., & Pigneur, Y. (2007). An assessment of NFC for future mobile payment systems. *Proceedings of the Sixth IEEE International Conference on Mobile Business (ICMB)*. doi:10.1109/ICMB.2007.9
- Ondrus, J., & Pigneur, Y. (2009). Near field communication: an assessment for future payment systems. *Information Systems and E-Business Management*, 7(3), 347-361. 10.1109/ICMB.2007.9
- Pires, G. D., Stanton, J., & Rita, P. (2006). The internet, consumer empowerment and marketing strategies. *European Journal of Marketing*, 40(9/10), 936–949. doi:10.1108/03090560610680943
- Sahut, J. M. (2006). Electronic wallets in danger. *Journal of Internet Banking and Commerce*, 11(2), 2006–2008.
- Saxena, A., Das, M. L., & Gupta, A. (2005, July). MMPS: a versatile mobile-to-mobile payment system. *Proceedings of the International Conference on Mobile Business* (pp. 400-405). IEEE. doi:10.1109/ICMB.2005.61

- Shaikh, A. A., & Karjaluo, H. (2015). Mobile banking adoption: A literature review. *Telematics and Informatics*, 32(1), 129–142. doi:10.1016/j.tele.2014.05.003
- Shaikh, A. A., Karjaluo, H., & Chinje, N. B. (2015a). Continuous mobile banking usage and relationship commitment—A multi-country assessment. *Journal of Financial Services Marketing*, 20(3), 208–219. doi:10.1057/fsm.2015.14
- Shaikh, A.A., Karjaluo, H., & Chinje, N.B. (2015b). Consumers' perceptions of mobile banking continuous usage in Finland and South Africa. *International Journal of Electronic Finance*, 8(2/3/4), 149–168.
- Shaikh, A. A., & Shah, S. M. M. (2012). Auto Teller Machine (ATM) Fraud-Case Study of a Commercial Bank in Pakistan. *International Journal of Business and Management*, 7(22), 100–109. doi:10.5539/ijbm.v7n22p100
- Shaikh, A. A., & Karjaluo, H. (2016). On Some Misconceptions Concerning Digital Banking And Alternative Delivery Channels. *International Journal of E-Business Research*, 12(3), 1–16. doi:10.4018/IJEER.2016070101
- Shanks, G., Tansley, E., & Weber, R. (2003). Using ontology to validate conceptual models. *Communications of the ACM*, 46(10), 85–89. doi:10.1145/944217.944244
- Shaw, N. (2015). Younger Persons are More Likely to Adopt the Mobile Wallet than Older Persons, or are they? The Moderating Role of Age. *Proceedings of the Twenty-first Americas Conference on Information Systems*, Puerto Rico.
- Smith, E. (2008). Pitfalls and promises: The use of secondary data analysis in educational research. *British Journal of Educational Studies*, 56(3), 323–339. doi:10.1111/j.1467-8527.2008.00405.x
- Sørensen, H. T., Sabroe, S., & Olsen, J. (1996). A framework for evaluation of secondary data sources for epidemiological research. *International Journal of Epidemiology*, 25(2), 435–442. doi:10.1093/ije/25.2.435 PMID:9119571
- Su, H., Wen, X., & Zou, D. (2013). A Secure Credit Recharge Scheme for Mobile Payment System in Public Transport. *IERI Procedia*, 4, 303–308. doi:10.1016/j.ieri.2013.11.043
- Tan, G. W. H., Ooi, K. B., Chong, S. C., & Hew, T. S. (2014). NFC mobile credit card: The next frontier of mobile payment? *Telematics and Informatics*, 31(2), 292–307. doi:10.1016/j.tele.2013.06.002
- Wonglimpiyarat, J. (2014). Competition and challenges of mobile banking: A systematic review of major bank models in the Thai banking industry. *The Journal of High Technology Management Research*, 25(2), 123–131. doi:10.1016/j.hitech.2014.07.009
- Worthington, S., & Welch, P. (2011). Banking without the banks. *International Journal of Bank Marketing*, 29(2), 190–201. doi:10.1108/02652321111107657