

## Mobile Banking

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# Foreword

We, at IDRBT, have been working on various important areas of interest to Banking Sector in India. In order to present some of the research work carried out by our faculty and other senior officials, the Institute has planned to bring out a series titled **IDRBT Staff Paper Series**. The present volume is the first in the planned series.

Each volume of the Staff Papers is intended to be on a specific theme of relevance to the Banking Sector. In view of its currency and importance, the first volume is focusing on Mobile Payments. The Institute intends to bring out future volumes on such topical themes, as and when staff members have undertaken research in that area.

In the first volume, we present three papers on mobile payments. While the paper by Dr. N. Raghu Kisore summarizes the features of various payments products across the globe, the paper by Mr. S. Lalit Mohan presents the results of opinions collected from various social media sites on the payment solutions offered by banks in India. Dr. MVNK Prasad and Dr. S. Ananth have carried out a survey on the usage of mobiles for banking and payments in two districts in the states of Telangana and Andhra Pradesh. The three papers put together present an overall assessment of mobile payments.

The survey conducted by IDRBT in the two states throws out the inadequacies in the mobile banking and payment solutions offered by the banks. More importantly, the survey captures the lack of awareness of such products and services.



In order to increase the usage of mobiles for banking and payments, the following can be considered:

- \* Banks may consider giving a mobile or a similar gadget, loaded with necessary apps as part of account opening kit to the customers
- \* The Government may consider providing mobile stations where uninterrupted high bandwidth data connections are available for completing transactions without fail
- \* Large scale education and awareness campaigns among bank staff and customers to ensure that mobile becomes the primary channel for most of the customers.

The Institute plans to bring out staff papers on a regular basis, each containing a few papers focusing on an important theme. Feedback on the series is solicited at [publisher@idrbt.ac.in](mailto:publisher@idrbt.ac.in).

A handwritten signature in blue ink, reading "A. S. Ramasastry". The signature is fluid and cursive, with a long horizontal stroke at the end.

**Dr. A. S. Ramasastry**  
Director, IDRBT

# **Study of Mobile Payment Solutions from Across the World**

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- **Dr. N. Raghu Kisore,**  
**Assistant Professor, IDRBT**

## **Chapter 1**

### **Executive Summary**

While the original purpose of internet was to foster academic and research partnership through information exchange, the primary interest in World Wide Web for the last two decades has been e-commerce and banking. The wide spread penetration and accessibility of internet – augmented by increased capabilities of Mobile Internet Devices (MIDs) – has led to a spurt in the number of online payment solutions.

While telecommunications has fostered an environment for transitioning from cash and paper economy to a card based economy, internet has created the possibility for the next phase of evolution namely moving from card based transactions to cashless and cardless economy. While the first decade of the 21<sup>st</sup> century, was dominated by internet commerce, the current decade belongs to mobile commerce. However, mobile commerce/payments has not seen the same amount and volume of growth as in case of other solutions and further, the growth of mobile commerce has been highly uneven across different world economies.

In spite of the massive growth in the number of e-commerce and m-commerce solutions being offered in different countries, we believe the growth is uneven due to a variety of factors, some of which are purely cultural and economical, while many others are technological and regulatory in nature. In this report, we study the mobile payment solutions provided in different parts of the globe and arrive at key observations that determine the success of mobile payments in respective countries. Table 1.1 captures the penetration of mobile

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phones, smartphones and finally volume of mobile payments across different regions of the globe.

Country	Population	SIMs Issued, % of Pop., Unique Subscriptions, No. of SIMs/User (Source: GSM Assoc.)	Smartphones (% of mobile users)	m-payments Tx. amt, Vol. (as of Dec 2014)
India	1.25B	752M, 39%, 488M, 2.84	181.5M (37%)	\$4B, 90M
China	1.36B	1.29B, 53.3%, 720M, 1.79	519.7M (72%)	\$3.66T, 4.5B
Africa	1.1B	374.5M, 33.7%, 539M, 1.44	N/A	N/A
Bangladesh	156.6M	125.1M, 43%, 67.1M, 1.86	N/A	\$1.03B, N/A
USA	318.9M	341M, 87%, 269M, 1.26	220M (71%)	\$50B, N/A
Europe	742.5M	687M, 57.9%, 430M, 1.6	279.5M (65%)	N/A
Japan	127M	160M, 90.5%, 115M, 1.39	80M (58%)	N/A
South Korea	49M	56M, 90.5%, 44.3M, 1.26	31M (70%)	N/A

**Table 1.1: Penetration of Mobile Payments across Different Countries**

The success of any payment model can be largely attributed to a rich ecosystem of merchants, customers and of course banks. In the traditional IP based (packet switched) payment systems, the carrier had no say in the payment systems. But cellular networks (until 3G) are different, they are circuit switched, unlike the bank's IT systems which are packet switched and hence in addition to telecom and financial regulations required to bridge the two types of networks, Mobile Network Operators (MNOs) have a significant say (when

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relying on SMS/USSD channels) in the success of the payment solution. While GPRS allows to provision banking services as Over-the-Top (OTT) services and thus reduce the dependency of the MNO, they require deployment of smartphones and associated apps to simplify user experience. The deployment of smartphone apps becomes a hassle in countries where the smartphone market is heavily fragmented by the presence of multiple hardware vendors and Mobile OS versions. Finally, provisioning of banking services as OTT services, requires good penetration of 3G and 4G networks and is a major constraint in all developing countries other than China. Finally, just as a predominant MNO greatly benefits fostering a rich ecosystem, dominant e-commerce leaders greatly reduce the interaction matrix between customer and merchants.

The most successful countries in adopting mobile payments are China, Africa and Bangladesh. Africa and Bangladesh are not necessarily successful models from the perspective of a bank-led model as their success is largely due to lack of alternative payment techniques. Africa and Bangladesh are successful MNO-led banking model and the success is largely attributed due to higher population densities and the existence of a dominant MNO. As indicated in Table 1.1, China is the largest success story for mobile payments largely due to the existence of a few dominant payment solutions in the form of UnionPay and Alipay (together hold 75% market share), dominant m-commerce players alibaba.com and JD.com (together hold 80% market share) and finally a dominant 3G and 4G mobile carrier in the form of China Mobile (60% market share).

Europe and USA are successful stories for electronic payments which encompasses mobile payments largely due to high penetration of smartphones (70%) and 3G/4G networks. Further, the smartphone

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market is dominated by high-end android and iOS platforms and hence experience limited fragmentation of phone hardware and OS. The penetration of advanced communication technologies have facilitated provisioning of payments solutions as OTT service, especially in the US. Mobile payments in Europe are still largely MNO-led mainly because of the cultural preference for AfterPay solutions and the MNOs allow people to make their m-commerce payments as part of their monthly telco bills. However, such a mechanism is possible because of a centralized credit history mechanism and the prevalence of postpaid connections.

South Korea and Japan to a significant extent are failure stories in terms of volume of mobile payments largely due to regulatory environment. Culturally credit payments are not preferred and the central banks also do not provide for credit cards as they exist in rest of the world. To a significant extent, mobile payments are essentially proximity payment solutions and are limited to payment of low value transit and utility services. Technologically, while smartphones have penetrated 70% of mobile users, the deployment of solutions based on electronic wallets has made it difficult to integrate multiple payment solutions and hence the mobile payment market is heavily fragmented.

India on the other hand has neither the advantages of the developed world nor of the developing world. The market is heavily fragmented because of multiple banks, commerce giants and MNOs. Finally, low penetration of technology in terms of 3G/4G and smartphones has greatly led to dependence on SMS and USSD payment solutions just as in case of underdeveloped countries. The delivery of solutions over SMS and USSD channels is greatly hampered by lack of a dominant MNO. Finally, while the establishment of a National USSD

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platform, has resolved issues related to bridging of banks and MNOs to some extent, QoS issues related to USSD are still a matter of concern to the end user.

In this report, we present a detailed study of 43 popular and well established mobile payment solutions widely deployed in the developed (29 solutions), developing (seven solutions) and underdeveloped (seven solutions) countries. The payment solutions were studied based on nine metrics. In all, 16 countries were chosen for the study, out of which seven were developed countries, three were developing and six were underdeveloped nations.

### Chapter 2

## Introduction

Payment industry is an ecosystem of different agents who bridge the geographical gap between a customer and a merchant by providing a solution whose sole intention is to simplify the process of value transfer between them. The simplification of the process of value transfer between the customer and merchant greatly aids in business and opens up new frontiers which today are more popularly called e-commerce and m-commerce. The process of simplification of value transfer greatly enhances business and thus the GDP of the country as the payment solution will be able to connect remote customers and merchants. Mobile payment systems also assist in increasing the velocity with which money can be transferred between two interacting agents.

Payment solutions, no matter whether the mode is e-commerce or m-commerce typically consists of an acquiring bank (represents merchant), issuing bank (represents customer) that are connected together via a payment gateway, payment processor and finally the card network. The purpose of the elaborate set of agents is to ensure trust, security and reconciliation of transactions made between the customer and merchant, at an affordable price to both the trading entities i.e. the merchant and the customer.

In a real world, one or more of the above agents are represented by hardware in the form of a POS terminal, a smart card (credit/debit/gift/top-up card) and finally a financial switch. The proliferation of internet and mobile communication technologies has led to replacement of the hardware peripherals by software only algorithms/systems. A major noticeable difference to the customer

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and merchant is the prevalence and widespread use of digital wallets. Software solutions being much cheaper have greatly aided in bringing down the average transaction fee associated with each transaction. The lower transaction cost made it financially viable for the agents to handle low value transactions which in turn increased the transaction volume. The rising transaction volume coupled with lower per transaction costs has led to a spurt of innovations in the arena of payment and settlement industry.

Transaction volume has been greatly aided by the increasing use of internet on mobile devices or more popularly known as Mobile Internet Devices (MIDs). The lowering cost of MIDs has resulted in the spurt of m-commerce in the last four years. Today, more people own an MID than an internet-only device (laptop and desktop) and is probably the only device for a vast majority of people in the developing and underdeveloped world.

While volume of mobile payments continues to increase, the total amount of money transferred over the mobile channel is nowhere near to the money transferred by the traditional wired internet channels. Given the vast number of mobile payment solutions available today and associated smaller market share of mobile transactions, we believe it is necessary to study the existing solutions and analyze the underlying reasons for the success and failure of these solutions.

### Chapter 3

## Evaluation Matrix

Given the vast number of solutions and the fact that most of the solutions are similar, we use the following matrix to simplify our evaluation process.

### 3.1. Ownership

Financial transactions can be broadly classified into two categories: aided by banks and unaided by banks.

#### 3.1.1. Aided by banks

These solutions require the sender and receiver to be associated with a bank. The association with the bank aids establishing trust between the transacting parties in dispute resolution.

#### 3.1.2 Unaided by banks

These solutions do not require any association with the bank and are largely operated as transfers between digital/mobile wallets. The wallets could be either hard (stored in cards) or soft (stored in a central repository or a piece of software on the user's machine). The wallet operator provides a web interface or an app to facilitate payments between registered partners. Depending on the regulations cash out feature may not be provided and at times the solution might operate as a Closed User Group (CUG).

### **3.2. Technology Aspects**

Technology is inherent to facilitate mobile payment solutions. The usability and affordability of the solution is greatly influenced by the type of hardware and software used to build the payment solution.

### **3.3. Legal Aspects for Customer Protection**

Mechanism for dispute resolution is a major requirement for any payment solution and this requires a central ownership of the payment cycle consisting of customer, merchant and/or bank. The central ownership could be a bank, telco operator, merchant, third party service provider/aggregator or a hybrid model encompassing one or more of the above operators.

### **3.4. Cost to Customer**

Different payment models incur varying costs. These costs are in the form of direct and indirect costs. Direct costs are one time fixed costs in the form of membership fee and transaction costs. The transaction costs levied are either in the form of tiered model or as a percentage of the transaction amount. Mobile payment solutions are more often not ubiquitous and many of the solutions work only on certain hardware and software and finally require support for either a last mile or long range communication bearer. The cost of hardware and communication bearer is most likely borne by the end user of the solution.

### **3.5. Monetary Thresholds**

While cash has no limit on the value that can be exchanged between the transacting parties, payment solutions often levy a minimum threshold below which the solution cannot be used. Many of the

solutions/platform do not allow for transferring monetary value below a certain threshold as such low value transactions are not financially viable to the solution provider.

### **3.6. Business Model**

Last mile or proximity, end-to-end, payment platforms, between banks (inter and intra), CUG or preferred use case for transactions like P2P, P2M, remittances, utility bills.

### **3.7. Regulatory Environment**

Financial and Banking regulations governing the mobile payment solutions is also a major differentiator and hence we discuss these regulations as part of ecosystem while discussing individual payment solutions.

### **3.8. Key Security Features**

We present details on use of authentication mechanisms like biometrics, One-Time Transaction Pin (OTP), use of HSM module, provision for two-factor authentication, encryption.

### **3.9. Communication Bearer**

The other major technology differentiator is the communication bearer used for the mobile payment solution. We identify whether the solution uses IP, GPRS, SMS, USSD or Voice channel (IVRS) for establishing the connection.

## **Chapter 4**

# **Popular Real World Deployments**

Size of banking industry and payment solutions being primarily related to GDP of the country and the per capita of people using the solutions, we analyze the mobile payment solutions across developed, developing and underdeveloped countries.

## **4.1. Developed Countries**

### **4.1.1. United States of America**

#### *Regulatory Environment*

The US federal laws allow for any monetary system to exist as long as it's value is tied to the dollar and the entities processing these transactions are registered as either a money service broker or payment and settlement agency. The federal laws deal with only legal compliance aspect of the solution and the actual ability to use the solution is limited by the definition of legal tender as defined by state laws.

#### **4.1.1.1. Google Money**

Google has deployed a new online banking solution called Google Wallet, which allows for transfer of money between Gmail accounts. The solution is embedded into Gmail and the source and destination of funds are uniquely identified based on Gmail accounts. The debit and credit of funds is done between the accounts (savings or credit or debit) associated with the respective Gmail accounts.

Google Wallet allows for money transfer through a simple email and has no transaction fee (zero transaction fee) between bank accounts of individuals. It charges a fee of 2.5% (i.e. the basic VISA/Master

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Card Transaction fee which anyway most vendors charge otherwise) if third party payment gateways like Visa/MasterCard are involved through the use of credit/debit cards.

This product is available in many countries where the respective central bank has approved/recognized it as a payment system. The settlement is done through Google Payment Corp (GPC) which is an authorized settlement agency by the US Federal Reserve.

### 4.1.1.2. Square

Square is not a credit card processor; it's an aggregator. Paymentech is the company that processes transactions for Square, and JP Morgan Chase is the company's acquiring bank (also called a member bank). Square's application collects credit card information and routes it to Paymentech where it is then routed through Visa or MasterCard's network to the customer's issuing bank.

Square now offers an offline (store and forward) mode for merchants to accept payments even without an available internet connection. Square uses processors and banks just like any other merchant service provider, and it's not exempt from the interchange fees that banks charge, or the assessments that Visa, MasterCard and Discover charge. Square pays interchange and assessment costs behind the scenes and passes these costs to its users via a bundled pricing model.

The unique selling points for Square are offline payments and enabling payments from cards to customer accounts. The cost of PoS terminal is greatly reduced as Square converts the smartphone into a PoS terminal using a swiper (a low cost device for reading). While the

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above works only for credit cards, for debit cards, Square has another solution called Square Cash. The process is simple:

- ◆ Create an email to whoever you want to pay
- ◆ Write the dollar amount of your payment in the subject line
- ◆ Send a carbon copy (Cc:) of the message to Cash@Square.com so they will know you are trying to make a payment
- ◆ If you like, you can write whatever you want in the message body (or you can just leave it blank)
- ◆ Send the email.

If it's your first time using the service, you will get an email from Square Cash asking you to provide your debit card number. The same is true for your payee. After about two business days, the funds will arrive in the payee's checking account.

### **4.1.1.3. Apple Pay**

Apple Pay is a mobile payment and digital wallet service by Apple. Apple Pay is a mobile payment service that lets certain Apple mobile devices make payments at retail and online checkout. Apple Pay works on iPhone 6 and iPhone 6 plus and all other Apple devices compatible with Apple watch. It digitizes and replaces the credit or debit magnetic stripe card transaction at credit card terminals. The service lets Apple devices communicate with point-of-sale systems using a Near Field Communication (NFC) antenna, a "dedicated chip that stores encrypted payment information" (known as the Secure Element), and Apple's Touch ID and Passbook. The unique selling points of Apple Pay are:

- ◆ Enhanced protection to credit card transactions
- ◆ Enhance privacy to transaction details.

### *Overview of Security and Privacy in Apple Pay*

Apple designed Apple Pay to use tokenization. Tokenization replaces the actual credit card number with a special number for making payments and hence enhances customer's privacy as the merchant cannot map the customer's profile to the transactions. Tokenization is not a new concept, but Apple's implementation is reportedly far more secure and brings tokenization into the real world. Traditionally, credit card tokenization was an online-only affair and the token vault – a database that maps tokens to credit card numbers – was maintained by the payment gateway.

Apple has worked directly with credit card networks like Visa and American Express to move tokenization to their end of the chain, according to details of Apple Pay's design revealed by POS provider Clover.

With Apple Pay, rather than receiving a card number, CVV, expiration date, and billing address from the customer, the merchant receives only a device-specific token and a dynamic, one-time-use security code. The token is translated into a credit card number only when it reaches the payment network, meaning that only the consumer's bank and the payment network have information about both the person and the transaction.

When a user first signs up for Apple Pay, either via an existing iTunes credit card or by loading a new one onto the iPhone, the card information is immediately encrypted and securely sent to the appropriate credit card network. Upon determining that the credit

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card account is valid, a token is sent back down to the device whereupon it's safely stored within the iPhone's Secure Element.

In addition to the token generated as per the EMV Payment Tokenisation Specification, completing a token-based transaction from a mobile device requires a form of personal authentication, which is where the simplicity of Touch ID rears its beautiful head. Instead of having to clumsily enter in a one-time password (static authentication data such as a PIN cannot be used), the payment process is finalized when a user authorizes it with Touch ID.

But there's a whole lot more to Apple Pay than Touch ID and the simple handing off of tokens. Providing an additional layer of security, an Apple Pay-equipped iPhone at the time of each transaction also sends a dynamically generated CVV up the chain along with a cryptogram. The CVV is the three-digit string located on the back of your credit card and, in the case of Apple Pay, is a algorithmically-generated dynamic string that's tied directly to the token. The cryptogram itself "uniquely identifies the device" that created the token and, according to the EMV Payment Spec, is likely comprised of encrypted data sourced from the token, the device itself, and transaction data. Note, though, that the precise components of the Apple Pay cryptogram aren't publicly known.

The important thing to remember, though, is that the cryptogram is effectively a one-time use digital signature that verifies that the token in transit originated from the device being used. Additionally, the cryptogram includes pertinent transaction data such as the identity of the merchant and how much is being charged.

### 4.1.1.4. Starbucks Mobile Payments

This is a closed group payment solution from Starbucks. The solution aims to improve in store purchase experience and is useful for purchasing Starbucks food and beverages only. The user configures his payment details in an app and can also choose the desired drink. He places the order within the Starbucks app and a unique code is generated for the purchase. The barcode is read by the PoS terminal in the store. The app based business process allows the user to keep track of his loyalty points without having to carry any additional card.

### 4.1.1.5. clearXchange

clearXchange is a payment and clearance system established by a consortium of six banks. Being an online banking solution, the customer is expected to have data connection enabled on his mobile phone. The user has an application enabled and should have his mobile number activated for clearXchange transactions by the bank. The most distinguishing feature is the solution allows for transfer of money between any type of account (savings/credit/debit cards) as long as his bank is a member bank of the above consortium. The solution suits US interests as 3G is well established across US and most Telco operators are in the process of migrating to 4G networks. Further, smart phones have penetrated 70% of US market.

## Europe

The Mobile Banking space in Europe is largely fragmented by multiple solution providers. Mobile Banking in Europe has become a necessity for banks in Europe mainly due to the 2008 financial crisis. Since the 2008 crisis, banks in Europe have become desperate to cut operating costs. By and large these solutions are replicas of the

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African model. Several member countries in Europe have felt that the mobile banking solutions adopted by African nations are good and are sufficiently secure enough. The following are the popular mobile payment solutions in different European countries:

### **4.1.2. Germany**

- ◆ Carrier Billing
- ◆ Accept Email
- ◆ Skrill Wallet
- ◆ UKash
- ◆ V Pay

There is nothing unique about the above wallet based payment techniques and hence we do not go into detailed discussion of the above techniques. However, Carrier Billing is a unique payment technique that stands apart. Carrier Billing is a mobile payment method where a consumer uses the mobile billing option during checkout at an e-commerce site to make a payment. After two-factor authentication involving a PIN and One-Time-Password, the consumer's mobile account is charged for the purchase. Carrier Billing lets wireless subscribers place the cost of a purchase for a digital good on their monthly phone bill.

It is a true alternative payment method that does not require the use of credit/debit cards or pre-registration at an online payment solution such as PayPal, thus bypassing banks and credit card companies altogether.

The other unique payment solution that is widely prevalent is UKash. UKash is an electronic money system wherein the customers exchange their cash for a unique 19-digit code representing their

prepaid money. After making a transaction, a new 19-digit code is generated to represent the balance, just like change in an offline cash transaction.

### 4.1.3. France

- ✦ Carte Bleue
- ✦ Kwixo
- ✦ Allied Wallet
- ✦ Web Money Transfer
- ✦ AfterPay

### 4.1.4. The Netherlands

Mobile payment technologies that are unique to Netherlands are:

- ✦ iDeal
- ✦ E-bon
- ✦ Klarna
- ✦ Billink
- ✦ Minitix

The unique feature about mobile/electronic payment solutions in Netherlands is the provision for ability to pay for services after they are delivered.

### 4.1.5. Belgium

- ✦ EgoPay e-wallet
- ✦ ping.ping
- ✦ Payza
- ✦ ING Home 'Pay

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### ***Observations of payment solutions in Europe***

Given the high penetration of banking services and bank aided credit and debit cards, there is no major penetration and demand for wallet based mobile payment alternatives. Bank aided solutions are predominant market shareholders. The only unique payment solution is telco supported billing for online purchases. That is, the customer can buy from select merchants by charging the bill against his postpaid monthly cellular bill. Finally, the use of BitCoin is widespread due to larger ecosystem of merchants who accept them.

#### **4.1.6. Japan**

Japanese banks entered the market in partnership with the mobile operator. The bank rents space on the mobile operator's payment platform, providing their credit card customers an opportunity to use their credit card. However, banks do not get any revenue from these transactions, but need to pay a fee for using the mobile operator's service platform. It should be noted that NTT DOCOMO is the dominant telco operator and hence is currently the only mobile payment platform provider. Several other solutions are much smaller (in terms of coverage and usage) and are often limited to specific services like e-payments at railway stations through business issued mobile top-up cards.

#### ***Regulatory Environment***

Japan is the best example of the MNO-led model. The growth of mobile payments in Japan was largely enabled after financial regulations were eased and banks were allowed to issue credit lines to individuals. Prior to this regulatory change, credit cards issued were largely a version of debit cards and were issued only by banks

where the customer held his bank account. The money owed by the individual was automatically paid from his bank account at the end of the month. Vast majority of payment solutions offered in Japan are primarily targeted at making proximity payments such as paying fare in public transit.

### **4.1.6.1. DOCOMO and Sumitomo-Mitsui's Mobile Wallet**

The Japanese mobile operator NTT DOCOMO began a cooperative venture with the Sumitomo Mitsui Card Company, a subsidiary of the Sumitomo Mitsui Group, to start a new mobile payment service called the DOCOMO "Mobile Wallet". In this solution, NTT DOCOMO supports only the cards issued by Sumitomo Mitsui. NTT DOCOMO developed and installed two types of PoS terminals: NFC-based and Felica-based card readers in the merchant premises.

### **4.1.6.2. DOCOMO iD new consumer service credit platform**

Based on the success of previous solution, DOCOMO created a consumer credit system called DCMX that satisfied a variety of demands as the perfect intermediary: a multi-function handset for consumers, a more convenient payment method for merchants, and more comprehensive coverage for banks. The ecosystem consists of consumer card implanted into mobile devices, a service platform called iD and thousands of iD readers and writers deployed at partner merchants.

### ***Key Observations***

Although DOCOMO's successful business strategy leveraged its innate strengths, the opportunity for entering this market was created by government regulation on the mobile payment industry.

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Banks could rent space in this consumer card, to enable the linking of the consumer's bank credit card account with the iD card. In this manner, consumers could pay for purchases made with the iD card reader directly from his/her bank account. DOCOMO would collect profits from two sides: first, a rental fee paid by banks for linking with the iD card platform, and second, a use fee paid by merchants for use of the of iD reader for transactions involving non-affiliated bank or credit cards. DCMX is as much a loan service as it is a credit service, but the amount of the money people could borrow was not dependent on the bank. DOCOMO gives the limit to every bank loan and even the bank revenue from the consumer interest.

### **4.1.7. South Korea**

#### *Regulatory Environment*

Since 2007, all providers engaged in electronic financial transactions are required to conform to the Electronic Financial Transactions Act (EFTA) legislated that year, which requires service providers to obtain a license, keep accounts separately for different lines-of-business (LOB), and ensure data security. Since the regulation was largely through licensing, it allowed multiple models to develop.

#### **4.1.7.1. BankOn**

In September 2003, LG Telecom (third largest mobile carrier) and Kookmin Bank jointly initiated a mobile banking service based on single IC chip technology called BankOn, which provided mobile banking services such as money transfer, banking remittance and account balance inquiries. This was not truly a mobile payment service but only a substitute for services previously provided by an ATM or value card.

This model benefitted LG Telecom through increased customer base; it did not give any chance for the mobile operator to profit from the mobile payment business, because the entire BankOn operation was controlled by Kookmin Bank.

Kookmin Bank initiated another cooperative venture with KTF (second largest carrier), which was the second biggest carrier in Korea. They launched a new service called KBank providing mobile banking services and mobile payment services together.

### **4.1.7.2. MBank**

SK Telecom initiated another mobile banking service named MBank using double-chip technology. The solution served as an aggregator for several smaller banks of the country. The double-chip technology meant that the chip with two independent parts could be controlled by banks and mobile operators respectively. The consumers' bank account information was controlled by the banks, and information on payment transactions, was controlled by SK Telecom.

### **4.1.7.3. SK Telecom**

Other banks too began to adopt the IC chip technology such as KorAm Bank and Pusan Bank. However, the inconsistency of various IC chips of different credit issuers created problems for consumers, who needed to switch the IC chips when they had to make payments by different credit card issuers. To solve this problem, in 2007, SK Telecom developed a new service platform where all subscribers could download software to their SIM card from the Internet, which will enable different credit cards to be used for mobile banking applications and public transportation applications. With the software download, consumers would no longer be required to

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switch IC chips when making payment from different bank accounts. Soon after KTF and LG have followed SK and launched the same kind of service.

## **4.2 Developing Countries**

### **4.2.1 India**

Interbank Mobile Payment Service (IMPS) is being offered by National Payments Corporation of India (NPCI) since late 2010. It is a payment system where the beneficiary is identified through a mobile number rather than an account number. The beneficiary should have an IMPS enabled bank account associated with this mobile number. The money transferred through IMPS gets credited into the account associated with the beneficiary's mobile number. It is offered in three forms. It was first offered with USSD as the bearer and later using SMS as the bearer. It is also available over internet (IP based). But in this report, we only consider USSD and SMS.

#### *Regulatory Environment*

The unique feature that is specific to India is the channel based monetary thresholds for mobile payment operations. Transactions up to Rs.10,000 is possible over SMS without any encryption and up to Rs.25,000 with a one-time password. SSL based encryption is necessary for any other amount. Further, mobile wallet operators cannot provide cash out feature.

#### **4.2.1.1. Vodafone m-pesa, Airtel Money and Idea Money**

While the concept of mobile wallets started in India in 2010, the banking regulations have led to redesigning of the features and

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business model provided by the mobile wallet companies. The most popular mobile wallet based payment solutions are Vodafone m-pesa and Airtel Money. During the pilot phase the cash in and cash out features was predominantly done through the respective agent outlets of the telco operator.

After Vodafone's 2010 pilot in Rajasthan, things changed in June 2012, when the Reserve Bank of India (RBI) started giving out licenses to start mobile wallet, and Vodafone applied. In November, the operators, including Airtel, were given licences to operate a semi-open mobile wallet – which allowed consumers to send and transfer money, pay bills and do recharges, but did not allow the user to take out cash. But the RBI did allow interoperability with a bank, which enabled Vodafone to tie up with ICICI Bank to allow cash out options.

m-pesa as claimed by the company, is a fast, secure and convenient way to transact on mobile and is wholly owned subsidiary Vodafone m-pesa Limited (VMPL) in association with ICICI Bank. VMPL has been authorized by RBI under Payment and Settlement Systems Act, 2007 for setting up and operating a payment system in India. VMPL is also a business correspondent of ICICI Bank.

For all practical purposes both the above mobile wallet operations are identical and are semi-open solutions. They are semi-open in the sense that they allow paying services only to partner business entities. While cash loading into the mobile wallet can be done through multiple means like debit card, internet banking and credit cards, cash out is possible only through a partner bank. The partner bank for m-pesa is ICICI bank and for Airtel Money it is Axis bank.

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Given the new initiative by RBI to launch payment banks, the above telecom companies especially Airtel and Vodafone will be able to provide for cash payout directly without the need for a partner bank.

### **4.2.1.2. Oxicash**

Digital wallets for banking purposes have been available in India since at least 2008. But these are largely prepaid wallets. That is, the digital wallet is tied to the customers' account and the digital wallet has to be topped up with money before it can be used for e-commerce. The most recent product in this direction is Idea Money. By and large these are prepaid instruments in digital form. These are built on IMPS infrastructure provided by NPCI.

Oxicash is the country's first non-bank based e-wallet. NPCI maintains the e-wallet for registered mobile users. This registration process is independent of bank account. Money can be deposited into this e-wallet using IMPS based transactions from any other account.

### **4.2.1.3. Paytm**

Paytm is a closed user mobile payment solution. It operates a mobile wallet and the wallet can be used for payment at multiple online commerce websites. Paytm does not have an associated member bank and hence does not offer cash out features. The cash can be loaded using multiple mechanisms just as in case of telco operated mobile wallets discussed above.

### 4.2.2. China

#### *Regulatory Environment*

Finance companies of enterprise groups (finance companies) are non-bank financial institutions established to enhance the centralized management and improve the efficiency of the funds of enterprise groups, and to provide financial management services for members of groups. According to the measures for the Administration of Finance Companies of Enterprise Groups issued by China Banking Regulatory Commission (CBRC), finance companies may provide services of collecting and paying money, accepting bills, discounting bills and so on to their members. Without approval from People's Bank of China (PBC), a non-bank financial institution is forbidden to engage in payment and settlement business.

#### **4.2.2.1. Alipay**

Alipay is China's leading third-party online payment solution. It is a direct subsidiary of e-commerce website Alibaba. Alipay is more of a platform that provides for multiple services to both direct and indirect customers. For mobile payments, it operates a wallet service. The primary services are:

- ◆ Cross-border Website Payment
- ◆ Cross-border Mobile Payment
- ◆ Auto Debit Service.

The unique business selling points are:

- ◆ Real-time payment solution: Chinese buyers purchase products or services from merchants' website and make a

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payment in RMB. Alipay will deduct the payment from the buyers' account in real-time

- ◆ Settlement: Alipay collects payment (RMB) from shoppers to buy foreign currency, and will then remit the sum to receiving bank account of merchants in settlement. At the moment, the settlement system supports 12 foreign currencies
- ◆ Auto Debit Service: Auto debit service automatically deducts the fixed amount on a regular basis and therefore shortens the payment process and operating cost. To complete the payment the customer does not have to not jump out of the merchant's website. The solution allows for a payment to be refunded within three months in order to enhance the confidence of online shoppers and assist to deal with trading dispute. The belief is a convenient payment experiences can improve customer loyalty. Alipay has solutions for system integrators to integrate Alipay as an alternate payment method in their respective merchant websites.

### **4.2.2.2. UnionPay**

UnionPay is primarily a domestic card service and also operates an interbank network in China. Since 2014, it has been working with both China's largest telecom company Unicom and Apple Pay to provide a mobile wallet and associated contactless payment solution. Union Pay has significant advantage as it is a bank card association and is also the interbank network operator.

### 4.2.2.3. Tenpay

While Alipay and ChinaPay have origins in internet commerce and card industry respectively, Tenpay is the first Chinese company to have its origins entirely in mobile payment industry. On Tenpay's platform, users can pay for hailed taxis and make in-app purchases on WeChat (Chinese equivalent of twitter) for orders ranging from local pharmaceutical chains to organic tea shops.

## 4.3. Underdeveloped Countries

Mobile payment solutions in the underdeveloped countries are quite unique due to lack of strong central bank regulations, lack of an established banking service. In addition, lower per capita income results in huge chunk of low value transactions. The only possible and obvious banking solution is mobile based payments. It needs to be observed that unlike other parts of the globe, the primary purpose of mobile payments is actually to transfer money between individuals, preferably between family members.

Table 4.1 provides a quick snapshot of various mobile payment solutions in the underdeveloped world.

### 4.3.1. Bangladesh

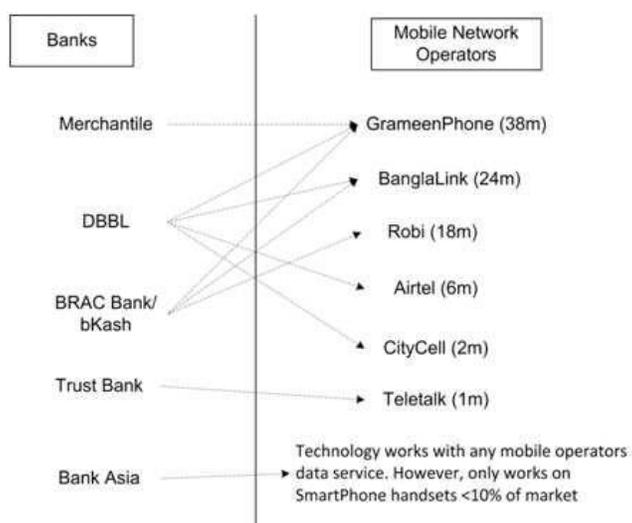
#### 4.3.1.1. bKash

Even though the Bank of Bangladesh (country's central bank) has approved more than 20 licenses to offer mobile financial services, more than 80% of transactions are through a single company bKash Limited. bKash provides for Cash In/Out, Payments, International Remittances, P2P payments, Bill Pay. bKash is a joint venture

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between BRAC Bank and Money In Motion LLC, USA. bKash is a leading MFS in Bangladesh, helping BRAC expand its reach beyond its ATM network and branches, and serving smaller rural villages.

The unique fact about bKash is that it is neither a bank nor an MNO. The primary reason for bKash market dominance is its bridging relationship between BRAC bank and the largest MNOs – GrameenPhone and BanglaLink.



**Figure 4.1: Mobile Payment Solutions of Various Banks and their MNO Partner**

### 4.3.2. Africa

SMS/USSD based banking has become increasingly popular in African nations where the banking regulator has allowed for a telco-centric model or a hybrid model involving both banks and telco.

## Mobile Banking

<b>Country</b>	<b>Product</b>	<b>Banker</b>	<b>Communication Bearer</b>
Kenya	m-pesa	Telco Operator	SMS
South Africa	Wizzit	Bank	SMS
Zambia	Celpay	3 <sup>rd</sup> Party	SMS
Rwanda	MobiCash	Telco Operator	SMS/USSD
Uganda	MTN Mobile Money	Telco Operator + Bank (Hybrid)	SMS
Nigeria	MobiCash	Telco Operator	SMS/USSD/IVR

**Table 4.1: Mobile Payment Solutions**

## Chapter 5

# Evaluation of Payment Solutions

In this section, we evaluate the mobile payment solutions based on the metrics identified in chapter 3. Table 5.1 provides a review of the solutions widely popular in USA.

### 5.1. USA

Evaluation Metric	Google Money	Square	Apple Pay	Starbucks	clearXchange
<b>Ownership</b>	GPC	Bank	Aggregator	Wallet Operator	Bank
<b>Technology</b>	Smartphone app/Email	Smartphone app/audio port/Email	iPhone	Smartphone app/NFC	Internet
<b>Legal Protection</b>	GPC	Square Chargeback Protection	As defined by CC	Starbucks	US Fed
<b>Cost to Customer</b>	Top-up fees as per CC rates	(2.75-3.5)% or a flat \$275 monthly fee	0.5¢DC	Top up fees as per CC rates	None
<b>Monetary Thresholds</b>	(0 to \$10000/day) & \$50000 for 5 days	0 to \$250 or \$2500 with valid SSN	As set by CC	None	None
<b>Business Model</b>	any-to-any	any-to-any	Merchant transactions	Only at Starbucks (CUG)	Between accounts (savings/CC/debit)
<b>Security</b>	HTTPS	HTTPS	Dynamic token and cryptograms	Bar codes	Mobile number as ID and HTTPS
<b>Communication Bearer</b>	GPRS/Ethernet	GPRS/Ethernet	GPRS/Ethernet	NFC	GPRS/Ethernet

**Table 5.1: Evaluation of Payment Techniques in USA**

### 5.2. Europe

Customer protection for electronic payments in Europe is covered by the European payment council and mobile payments and wallet payments are specifically protected by the directive 2007/64/EC on payment services in the internal market (approved by the European Parliament through an EPC meeting held on 13<sup>th</sup> November 2007). In

## Mobile Banking

In addition, each country might provide for more protective measures through other national laws and also set their own monetary thresholds for mobile payments. In each of the European countries following, we do not evaluate the solution for “Legal Protection” and “Regulatory Environment” as they are all part of the Single Euro Payment Area (SEPA) and are financially regulated as part of the European Central Bank (ECB).

<b>Evaluation Metric</b>	<b>Carrier Billing</b>	<b>Accept Email</b>	<b>Skrill Wallet</b>	<b>Ukash</b>
<b>Ownership</b>	Telecom	Aggregator	Wallet Operator	Payment Service
<b>Technology</b>	Smartphone	Smartphone	Smartphone	Smartphone
<b>Legal Protection</b>	Ombudsman	Bank	European Payments Council (EPC)	European Payments Council (EPC)
<b>Cost to Customer</b>	None	None	1% up to max of €10 Merchant payments are free	£2 per month thereafter
<b>Monetary Thresholds</b>	As set by MNO	As set by CB	Max €2500 €1000 per transaction	[1]
<b>Business Model</b>	Partner Merchants	Utility/Billers	P2P and P2M	W2W and Partner Merchants
<b>Security</b>	OTP	Decided by bank	PCI-DSS Level 1	Website security
<b>Communication Bearer</b>	GPRS	GPRS	GPRS	GPRS

**Table 5.2: Evaluation of Payment Techniques in Germany**

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Evaluation Metric	Carte Bancaire	Kwixo	Allied Wallet	Web Money Transfer	AfterPay
<b>Ownership</b>	Payment Platform	Wallet Operator	Wallet Operator	Payment Platform	Wallet Operator
<b>Technology</b>	Smart-phone	Smart-phone	Smartphone	Smart-phone	Any phone
<b>Cost to Customer</b>	None	2.05%	1.95%	[10]	3.35% + €1.4/Tx
<b>Monetary Thresholds</b>	Set by bank	N/A	None	[10]	[9]
<b>Business Model</b>	m-commerce	P2P/P2M	P2P/P2M	P2P/m-commerce	m-commerce
<b>Security</b>	HTTPS	HTTPS	PCI-DSS Level 1/ SHA256 SSL	HTTPS	HTTPS
<b>Communication Bearer</b>	GPRS	GPRS	GPRS	GPRS	SMS/GPRS

**Table 5.3: Evaluation of Payment Techniques in France**

Evaluation Metric	iDeal	E-bon	Klarna	Billink	MiniTix
<b>Ownership</b>	PSP	Gift Cards	PSP	PSP	Wallet Operator
<b>Technology</b>	Smartphone	Any phone	Smartphone	Smartphone	Any phone
<b>Cost to Customer</b>	0.45€/Tx	None	1.69€+ 3.25% or 29€ monthly fee	N/Avail	N/Avail
<b>Monetary Thresholds</b>	Min Tx amt is €1.25	None	None	None	Max €150
<b>Business Model</b>	P2M	m-commerce	Post-pay/m-commerce	Post-pay/m-commerce	–
<b>Security</b>	2 FA	e-code	2 FA	2 FA	SMS
<b>Communication Bearer</b>	GPRS	GPRS	GPRS	GPRS	Unique T-PIN

**Table 5.4: Evaluation of Payment Techniques in The Netherlands**

Evaluation Metric	EgoPay	Payza	ING Home'Pay	Ping.Ping	Yandex.Money
<b>Ownership</b>	Wallet	Wallet	Bank	Wallet	Wallet/ Payment service
<b>Technology</b>	Smart- phone	Smartphone	Smart- phone	Any phone	Smartphone
<b>Cost to Customer</b>	[6]	[7]	CC Charges	[8]	0.05%
<b>Monetary Thresholds</b>	[6]	[7]	Same as bank	€25/ transaction and €2500 in wallet	P2P, m/e- commerce
<b>Business Model</b>	P2P/P2M	Remittances	e/m- commerce	e/m- commerce	–
<b>Security</b>	HTTPS	HTTPS	HTTPS	PIN for wallet access	Unique T-PIN
<b>Communication Bearer</b>	GPRS	GPRS	GPRS	SMS	GPRS

**Table 5.5: Evaluation of Payment Techniques in Belgium**

### 5.3. Japan and South Korea

Japan and South Korea are better positioned to provide a cashless society as they have 100% penetration (considering only adult population) of mobile phones and a 58% and 70% penetration of smartphones respectively. The mobile payment solutions are based on GPRS. Further, NFC chip has become a standard feature for smartphones and hence enjoy wide use of contactless payments. About 80% of the time mobile payments are used for low value transactions for daily services such as public transport and public utility services. In Japan, SIM-less phones are popular and hence electronic wallets are built into the phone. The electronic wallets provide necessary security and the partner bank (of that MNO) puts the card credentials on the secure element. The business model is a hybrid model where merchants, MNO and bank work together to

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deploy the solution. The mobile payment solutions are custom-built and this makes the electronic wallets non-interoperable. Further Japan, has adopted proprietary NFC technology and hence international solutions do not work with the mobile payment infrastructure deployed in Japan. Table 5.6 provides a review of the solutions widely popular in the Far East countries namely, South Korea and Japan.

Evaluation Metric	Japan		South Korea		
	DOCOMO and Sumitomo-Mitsui Mobile Wallet	DOCOMO ID	BankOn	MBank	SKTelecom
Ownership	MNO + Bank	MNO + Bank	Bank	Bank	Bank
Legal Protection	N/A	N/A	N/A	N/A	N/A
Cost to Customer	None	None	None	None	None
Monetary Thresholds	Unknown	Unknown	Unknown	Unknown	Unknown
Security	EAL4 level in ISO15408	EAL4 level in ISO15408	HSM	HSM	HSM
Communication Bearer	RFID/Felica	RFID/Felica	Single IC Chip	Single IC Chip	Single IC Chip

**Table 5.6: Evaluation of Payment Techniques in Far East**

### 5.4. India

As of today wallet operators in India are not allowed to facilitate cash out feature for customers. However, money can be cashed out through a partner bank associated with Vodafone m-pesa. We do not present analysis for Airtel Money and Idea Money as they are very much identical to m-pesa with the only difference being in the partnership bank used for funding the wallet. In each of the three cases while the initiators of a transaction has to be MNOs customer

## Mobile Banking

while the recipient does not have to be. The recipient gets the money credited into the mobile number registered with a partner bank for the purpose.

On the other hand, while Paytm is also a wallet operator it offers much better monetary thresholds. The maximum monetary value that can be stored at any point of time in a Paytm Wallet Prime Account is Rs.1,00,000. The maximum permitted value of transactions at any point of time in Paytm Wallet Prime Account is Rs.1,00,000. The maximum monetary value that can be stored and utilized in a month in a Paytm Wallet Basic Account is Rs.10,000. The maximum monetary value that can be transferred from one Paytm Wallet Account to other Paytm Wallet or bank account in a single transaction is Rs.5,000. The maximum monetary value that can be transferred from one Paytm Wallet Account to other Paytm Wallet or bank account in a single month is Rs.25,000. Table 5.7 provides a review of the solutions widely popular in India.

Evaluation Metric	IMPS	Vodafone m-pesa	Oxicash	Paytm
<b>Ownership</b>	Platform	MNO	Non-bank Wallet	Wallet operator
<b>Technology</b>	Any phone	Any phone	Smartphone	Smartphone
<b>Legal Protection</b>	Ombudsman	Ombudsman	Ombudsman	Ombudsman
<b>Cost to Customer</b>	None	1.2 to 1.5%	1% (Min of Rs. 10)	4% at cash out
<b>Monetary Thresholds</b>	Set by Bank	Rs. 5000 per day	Rs. 10000 per day	Rs. 1,00,000
<b>Business Model</b>	Acc-to-acc	Remittances/bill payments at partner merchants	P2M/P2P	e-commerce
<b>Security</b>	PIN	4-digit PIN	SSL/6-digit OTP	HTTPS
<b>Communication Bearer</b>	GPRS	GPRS	GPRS	SMS

**Table 5.7: Evaluation of Payment Techniques in India**

## 5.5. China

Even though mobile payments are large by volume and fast growing, customer protection laws are limited in China and the People’s Bank of China (the central bank of the People’s Republic of China) is working on new regulatory model to address this. Alipay has a market share of 45%, followed by UnionPay with 30% and Tenpay with 15%. Chinese mobile payment solutions primarily concentrate on mobile commerce in order to improve e-commerce from their partner websites that have considerable global presence. All three solutions indicated above facilitate forex transactions for international customers and are widely popular in over 100 countries outside China. Table 5.8 provides a review of the solutions widely popular in China. Starting from August 2015, The People’s Bank of China has established monetary controls on the amount of money that can be moved using mobile wallets. As per the new regulations, there is a per-day limit of \$500 and a yearly limit of \$200,000.

Evaluation Metric	Alipay	UnionPay	Tenpay
<b>Ownership</b>	Payment Platform	Wallet operator	Wallet operator
<b>Technology</b>	Smartphone	Smartphone	Smartphone
<b>Legal Protection</b>	Ali Express/Escrow	PBC	Limited
<b>Cost to Customer</b>	0.6%	1%	(0.7-1.2)%
<b>Monetary Thresholds</b>	–	None	As set by bank
<b>Business Model</b>	e-commerce	B2B, e-commerce	P2P & e-commerce
<b>Security</b>	HTTPS	SSL	HTTPS
<b>Communication Bearer</b>	GPRS	NFC/GPRS	GPRS

Table 5.8: Evaluation of Payment Techniques in China

## 5.6. Africa and Bangladesh

Given the poorer economic background, the solutions deployed are designed to work on feature phones over SMS channel. No

## Mobile Banking

encryption is provided in any of these solutions. PIN provided at the time of registration serves to identify the genuine customer/account holder. The actual transaction is completed based on another PIN generated uniquely for each transaction. The transaction PIN is provided to the sender and it is his responsibility to share it with the receiver safely. The working details of transaction PIN is similar to the technique adopted by Western Union for money transfers between individuals.

MobiCash [5] has grown over a period of time and has now tied up with a few merchant outlets and also banks to facilitate true m-commerce transactions. The company today exists in over 10 African countries and has recently started operating in Pakistan [4]. MobiCash and other mobile payment solutions have grown in size and have started microfinance operations in a small way, by operating their own set of business correspondents. Table 5.9 provides a review of the solutions widely popular in underdeveloped countries.

	Bangladesh	Kenya	South Africa	Zambia	Rwanda	Uganda	Nigeria
<b>Evaluation Metric</b>	bKash	m-pesa	Wizzit	Celpay	Mobi-Cash	MTN Mobile Money	MobiCash
<b>Ownership</b>	Aggregator	MNO	Bank	3 <sup>rd</sup> Party	MNO	MNO + Bank (Hybrid)	MNO
<b>Legal Protection</b>	bKash helpline	Agent	Helpdesk	Agent	Helpdesk	Agent	Helpdesk
<b>Cost to Customer</b>	[2]	[3]	4%	3%	(1.3-5)%	(2-4)%	(1.3-5)%
<b>Monetary Thresholds</b>	10000 BDT [2]	Ksh 100000 [3]	N/Avail	N/Avail	N/Avail	N/Avail	N/Avail
<b>Business Model</b>	Remittances	Utility Bills	Remittances	Utility Bills/ Remittances	Utility Bills	Utility Bills	Remittances
<b>Security</b>	PIN	T-PIN	T-PIN	T-PIN	Biometric/PIN	T-PIN	T-PIN
<b>Communication Bearer</b>	SMS/USSD	SMS	SMS	SMS	SMS/USSD	SMS	SMS/USSD/IVR

**Table 5.9: Evaluation of Payment Techniques in Underdeveloped Countries**

## **Chapter 6**

### **Conclusion**

A typical mobile payment solution involves convergence of hardware and software running on the mobile phone, co-operation and co-ordination of MNO, banks and finally the merchants if mobile commerce is to be served. The communication bearer i.e. SMS/USSD/GPRS makes a huge difference in the user convenience, functionality and finally security.

#### **6.1. Developed Countries**

Enjoy a mobile penetration of close to 100% (considering only adult population) and a 55% penetration of smartphones. This makes it easier to deploy solutions based on GPRS connection. The use of GPRS for mobile payments provides the following advantages:

- ◆ Better security features and hence ability to move larger amount of money
- ◆ Smartphone enables delivery of payment solutions through apps and apps makes it more convenient to facilitate m-commerce
- ◆ Dependency on telco operator is removed.

While it is true that none of the mobile payment solutions deployed in the developed are interoperable, interoperability is not a concern as each payment solution meets all requirements of the specific target group it is aimed at.

The only surprise countries in the developed world are Japan and South Korea. Both these countries in spite of high penetration of smartphones (100% penetration of mobile phones and a 58% and 70% penetration of smartphones respectively), have limited mobile commerce activity. The primary use case for mobile payments is proximity payments for public transit and utility bills. The poor penetration of mobile commerce is due to the financial regulations, lack of a dominant bank, the adoption of electronic wallets (MNO partially controls the wallet) and lack of a dominant MNO.

### 6.2. Developing Countries

SIM penetration in India is about 70% and the number of unique mobile users is about 40% of population. Smartphones in India compose only 15% of the population and 37% of mobile phone users. The low penetration of smartphones and the heavy fragmentation of smartphone market in the country both in terms of hardware and software makes it difficult and uneconomical to provide for mobile payments over GPRS. Hence, SMS and USSD channels remain the preferred mechanism. Use of SMS/USSD requires a great deal of support from the MNO. The level of co-operation required between banks and MNO has a significant impact on the success of a mobile payment solution. The financial regulations prevailing in the country largely decide the interoperability agreements between banks and MNOs. Table 6.1 indicates the primary differences and limitations of SMS and USSD channel.

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SMS	USSD
Communication cost borne by end user	Charges to be delegated/negotiated by telco operator
Contents stored by the network operator (Store and forward)	Real-time processing
The store and forward mechanism might make it less secure	More reliable and secure as it is processed in real-time
Peer-to-peer communication is possible	No mobile-to-mobile communication possible
Interoperable as there is no operator assigned code (other than mobile number)	Interoperability between operators not possible as USSD code is uniquely managed by telco operator. That is, different telco operator can reserve different USSD code for the same service
Limited to 160 characters in length (per SMS message)	Limited to 182 characters in length
Allows for only one-way communication in a single session (Simplex)	Allows for two-way interactive communication through USSD session (Duplex)

**Table 6.1: Overview of SMS/USSD Channel**

The presence of multiple large MNOs makes it necessary for a bank to work and operate with multiple MNOs. This complex matrix further makes it difficult to provide a seamless mobile payment solution for the end customer at least on USSD. Finally, the inability to provide security over SMS and USSD channels to the same level as on GPRS makes it necessary to place a limit of Rs.10,000 on the solution. This makes it difficult for the user to consider the mobile banking/payment solution as a single point solution.

China is largely able to overcome market fragmentation due to dominant players in mobile (China Mobile 65%), large payment provider/Bank (Alipay, UnionPay and Tenpay constitute 90% of market), e-commerce platforms (Alibaba and JD constitute 80% of market share). The success of mobile commerce has made mobile phone a primary tool for other payments such as inter and intra bank transfers, remittances, bill payments and wallet-to-wallet transfers.

### 6.3. Underdeveloped Countries

The vast majority of underdeveloped countries in Africa and Bangladesh are geographically smaller and often do not have a well-established brick and mortar banking channel. This makes it attractive to have a mobile banking channel. Further, the smaller geographical size and smaller population has led to the prevalence of a single dominant MNO and bank in these countries. This makes it easier to have a single and predominant mobile payment provider in the country.

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# **Mobile Banking Sentiment Analysis & Usability Consideration**

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- **Shri S. Lalit Mohan,  
Senior Technology Manager,  
SBU, IDRBT**

### Chapter 1

## Executive Summary

Mobile First is becoming the new paradigm for product launches. With large mobile user base and exponentially increasing smartphone users, banks need to continuously monitor customer pulse and improvise the banking app to suit the needs. This chapter describes the sentiment analysis of 303,694 postings of mobile banking customers on Google and Apple App stores. The broad themes of the user comments are also listed in this chapter. User comments related to “Usability” are further analyzed and Usability parameters for building Mobile Banking apps are listed.

## **Chapter 2**

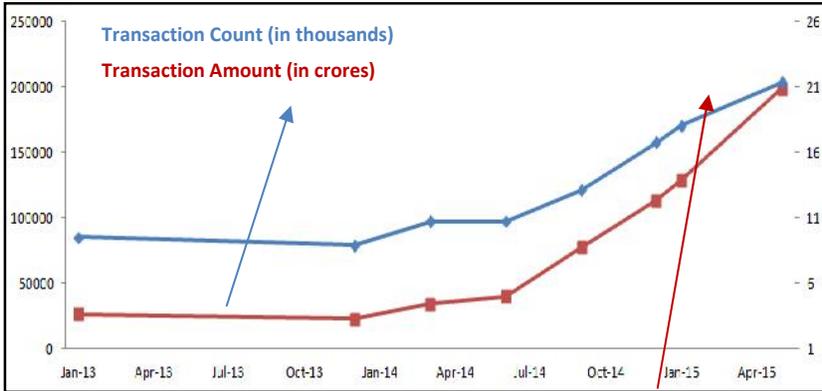
### **Introduction**

Mobile phones are becoming the extended organs of humans. More than 70% of Indian population has mobile phones. 65% of the mobile phones in India are still feature phones, however, with growing economy and cheaper electronics, smartphones are becoming more affordable. In the next four years, the percentage of smartphone users would be greater than 70%. Cheaper data plans and availability of high speed 3G and 4G connections has made access of internet on smartphones easy. 65% of India's population is below 35 years; the millennial and "Z" generation getting into mainstream development of India are always digitally connected. Majority of their usage of internet on smartphones is related to access of social media like Facebook, WhatsApp, Twitter or e-commerce applications, etc., as compared to Mobile Banking. This distinct advantage of majority of the Indian population being young and digital savvy provides opportunities for faster growth of mobile banking. Mobile Banking adoption has increased by 124% in terms of transactions and by 658% in terms of average transaction size in the last two years because of ease of access anytime from anywhere and also the special focus given by banks in improving mobile banking features. A report published by the Reserve Bank of India (RBI) suggests that a mobile banking transaction costs just 2% of the cost of a branch transaction, one-tenth of the cost of an ATM transaction and half the cost of Internet banking transaction. According to the Global Mobile Banking Report, published by KPMG in conjunction with UBS Evidence Lab, this past growth is just the beginning. The number of mobile banking users globally is forecasted to double to 1.8 billion over the next four years, representing over 25% of the world's population.

119 banks in India have been granted permission to offer Mobile Banking. This includes public and private sector, foreign banks with

## Mobile Banking

retail banking presence in India and cooperative and regional rural banks. In the last two-and-a-half years, the number of transactions on mobile platform has increased 7.5 times and the average transaction amount has increased by almost 3.5 times.



**Figure 1: Bank-wise Volumes in ECS/NEFT/RTGS/Mobile Transactions**  
(Source: RBI Statistics)

Considering that more than 70% of the current/potential customers are using internet on smartphones and are accessing social media sites for 45% of their connected time, banks have adopted social media channels and started Listening, Engaging and Optimizing their interactions with current/potential customers. ICICI, Axis, SBI, Yes, HDFC, IDBI and Kotak are among the top-20 banks in the world in social media adoption. Banks initially used social media channels for branding and customer awareness, moved to listening and handling customer concerns and some of them are now offering P2P payments and other transactions.

This document describes the customer sentiments based on the comments posted in App stores hosting Mobile Banking apps. This sentiment analysis may be used for addressing operational issues and product positioning by the banks. It analyzes 303,694 comments posted by the customers in the last one year on Google and Apple stores of 51 Indian Banks.

### Chapter 3

## Observations

The comments of 51 banks logged in app stores are reviewed for sentiments (positive, negative and neutral). Also, a survey was conducted on 1434 participants (white collared and middle-aged employees working in BFSI and Software Industry) using WhatsApp, LinkedIn, Facebook and email channels to understand the opportunities for improving mobile banking adoption. Though majority of the comments state that users are positive about the Mobile Banking, the sentiment of 34% users could have been better.

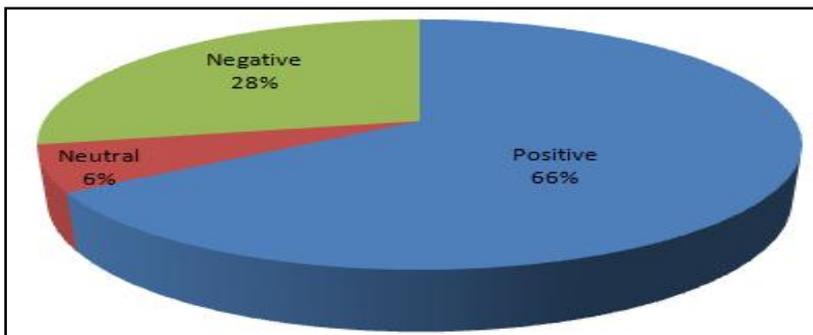
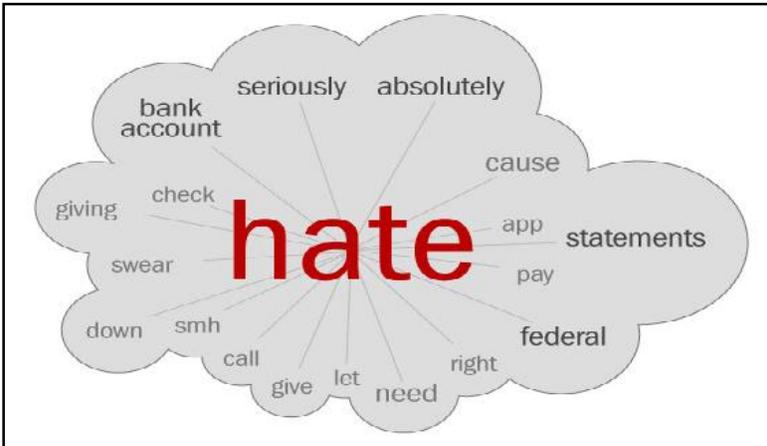


Figure 2: Sentiment Analysis of Postings on App Stores

Customer Awareness, Network Challenges, Security and Usability are seen as the primary opportunities for improvement based on the customer feedback posted on the app stores. Banks ensure mobile apps are secured and safe for usage; RBI has strict guidelines on Mobile App Security. Government of India with Digital India program is encouraging internet service providers to connect to remote areas and improve the quality of network service. Banks are using Social Media, TV and Newspaper channels for improving customer awareness including providing reward points/cashback offers for adoption of Mobile Banking. However, improving Usability needs

attention based on the comments posted on the app stores hosting Mobile Banking apps.

The sentiment analysis of two million conversations on banks and related organizations across the world suggest that social media channels are used for expressing negatives/concerns.



**Figure 3: Word Cloud of Social Media Postings on Banks (Source: Financial Brand)**

The sentiments analysis of top-5 banks (in terms of transactions count and amount) and all the banks having mobile banking presence shows that users are vocal about their likes and dislikes.



Figure 4: Positive Word Cloud of Top-5 Banks Positive Word Cloud of All Banks

Majority of the positive comments on Mobile Banking are on availability of features such as transfer of money, ability to make card payments, getting account summary, ease of access, etc. Banks could continue to add features and could transform from channel-based banking to omni-channel banking.



**Some of the negative themes based on the postings are:**

- Gives msg 'Mobile no. not found'. Although my mobile number is registered
- Problem in installing & generating OTP. Again doesn't work on Redmi 1s with MIUI 6
- Why should we pay Re.1 to open the application? ...coz many banks like XXXX, their application is more user-friendly....they don't need any charge to open...
- Simplify apps with inbuilt tamper-free security rather answering questions start use of digital signatures assigned to individuals
- Screen flickering and UI goes blank sometime
- Application tends to take much more time then compared to other competitive bank, on 2G it tends to hang does not show proper error messages
- Taking least and only required inputs...for any operation on mobile banking app...Building trust in users to adopt mobile banking/marketing providing security pin generator token/device...even to farmers...and rest of the banking should be carried out with DTMF/SMS based inputs...as these are the easiest to use...any person can easily adopt it. Separate/dedicated communication channels via service providers should be opened with highest security measures.”

## **Chapter 4**

# **Recommendations**

Banks constantly look for opportunities to improve the alternate channels (mobile, internet and ATM) usage. The bank team managing social media channels could extend their services to respond to customer comments on the app stores, this enhances the engagement level. Banks that are yet to implement social media should leverage existing customer operations to respond to the queries and resolve the issues.

### **4.1. Features List**

Some of the common features identified based on posting on the app stores are:

- 1) A simplified registration process without SMS charges would make the customer happy in his/her mobile banking adoption
- 2) Availability of account statement and balance information
- 3) Common beneficiary list across alternate channels, a step towards omni-channel
- 4) Fund Transfer and Bill Payments including DTH, mobile recharge, etc.
- 5) Recurring Deposits and other deposit schemes request on mobile banking
- 6) Ability to request for cheque book and stop payment
- 7) Information of nearest ATM and Branch.

### **4.2. Usability**

Apart from the listed features, banks should have additional focus on Usability (Non-functional requirement in Software Engineering). UI Guidelines for iOS Human Interface Guidelines, 2014; Mobile App Design from Android, 2014; and Microsoft for Windows Mobile –

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Usability Guidelines, 2014 provides guidance on the mobile app building. Also, there are other usability models suggested by Nielsen and Norman group (Mobile Website and Application Usability) and People at the Centre of Mobile Application Development (PACMAD) model. In addition, the five human computer interface laws (1) Miller's law of STM (Short Term Memory) (2) Fitts' Law, (3) Hick-Hyman Law, (4) Power Law of Practice, and (5) Zipf's Law provide a grasp of the human aspects of remembrance, time taken to make a decision based on the available choices and user expectations on keeping most frequently used as the first option as they have an impact on user perception on usability. Usability can be measured based on the following factors:

- i. Time taken to complete task: Intuitively this can be a measure as the number of clicks
- ii. User interface display parameters: This refers to the font, colours, etc.
- iii. Error handling: This focuses on the error messages and the techniques to handle them.

### **4.3. Time Taken to Complete Task**

A task is considered as a specific action that needs to be completed to satisfy certain set of requirements. For example, adding beneficiary account, performing money transfer, making cheque book request, navigating through the screens, etc., are tasks that need to be completed. The time taken to complete the task is measured using specific number of clicks needed on the mobile phone to complete it.

## Mobile Banking

A1 – Account summary (using SIM, IMEI and other device information without disclosing any personally identifiable information), nearest ATM/Branch, and contact information of call centre (with option of click-to-call) should be available without login using account number and password.
A2 – Maximum five fields should be sought from the customers while completing a form on the screen.
A3 – Screen navigation should start with more familiar fields (amount to transfer/deposit, deposit period, beneficiary name, account number, IFSC code, etc.).
A4 – Based on user’s previous actions, there should be an option to set user/default favorites.
A5 – Breadcrumbs should be available to keep users informed on the navigation.
A6 – Labels of the fields should be in layman language and unambiguous for customer rather using bank specific terminology.
A7 – The option for “Select All” or “Delete All” should be removed.
A8 – Banking operation that started on a desktop, branch or ATM should continue over the mobile app without keying in data again.
A9 – Mobile app registration should not require going to bank branch and can be loaded from authorized app stores. The registration should be free of any SMS charges.
A10 – Sensitive information such as date of birth, customer account number that are already known should not be requested in the app.
A11– Related fields should be grouped together (for example, beneficiary, user account details, etc.). Also, known fields should be pre-populated.

**Table 1: List for Reducing the Time to Complete Task**

### 4.4. User Interface Display Parameters

The font size/type, display colours, controls size and labels change the user perception of the Mobile Banking app. Though each individual has their own liking for a colour, font and other display parameters, the implementation of suggested parameters would enrich user experience with respect to the interface of the Mobile Banking app.

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B1 – Colour combination in foreground and background should be consistent across screens and contrasting without any gradient/progressing colours.
B2 – Text information should be in mixed/sentence case instead of upper case.
B3 – Avoid pagination, vertical scrolling and horizontal scrolling.
B4 – Text in text boxes should be in single line and not spread across multiple lines.
B5 – Measures for size of button, text box and other controls relative to screen size instead of pixels.
B6 – There should be a bank logo, title page and frame on every screen.
B7 – White spacing between fields should be sufficient to view labels without overlapping.
B8 – Language used should be simple and consistent with no long sentences and paragraphs on the screens. Having local languages based on user preference would be highly beneficial for users.
B9 – There should be clear character spacing to avoid overlaps.
B10 – Bold text should be used sparingly.
B11 – The alignment of fields (left for text fields and right for numbers) should be consistent.
B12 – There should be left navigation available for moving between menu options.
B13 – There should not be any drag and drop based features.
B14 – The image icons should be tested for varying resolutions (ldpi, mdpi, etc.) and different OS.
B15 – Apps should be built using HTML5 for consistent look.

**Table 2: List of User Interface Display Parameters**

### 4.5. Error Handling

As the mobile phone screens are smaller in size than the desktops' and the user attention for detail on smaller screens is difficult, it is important that apps are thoroughly tested for various screens and device types and performance against various connectivity options.

## Mobile Banking

It is important that appropriate error messages are informed early rather than later and thus reducing the customer concerns on app stores, call or other modes of escalations to bank's operations team.

C1 – System messages should be classified as Information (with text in Green/Blue color), Warning (with text in Yellow color) and Error (with text in Red color).
C2 – If a particular mobile device is not supported, an error message should be displayed instead of allowing the user to install and then show an error message.
C3 – Error messages while filling a form should be displayed next to the fields and button.
C4 – The message should provide the reason for error and suggests the next possible action.
C5 – Application should maintain user action persistence and recovery from abrupt exits (network connection lost, session timeout, battery down, memory shortage, etc.).
C6 – System messages should be configurable values rather than hardcoded for change at a later point of time.
C7 – Language of the error message should be in layman language and easy to understand and avoid displaying any bank specific error messages.
C8 – Error messages while loading a page should be at the top of the screen.
C9 – The help icon should always be available and contextual to the screen.
C10 – The app should be tested for varying network bandwidth, device models (make and screen size), flip/bump, back button and other buttons on the device, stylus, trackball/pad, swipe operations, screen rotation, mobile keys, battery consumption and memory usage.
C11 – The app should have an option for user to report the error.
C12 – The version updates should be done on regular basis and ensured to keep past favorites intact.

**Table 3: List of Error Handling Parameters**

## **Chapter 5**

### **Conclusion**

Banks should constantly analyze and respond to customer comments posted on social media channels including app stores hosting banking apps. The customer comments provide an insight into feature enhancements, usability concerns, etc. Improving usability is a constant journey with changing customer experiences and technology innovation, hence, it is recommended for banks to review the usability requirements on a yearly basis monitoring the feedback on app stores and the customer queries being handled by bank operations team. The usability parameters could also be extended to apps that banks are planning to deploy for internal stakeholders. Better usability and enhanced feature list of mobile apps improves customer loyalty and hence customer's stickiness to the bank.

**Reality Check:**  
**Usage of Mobile and**  
**Mobile Banking in District, Mandal**  
**Headquarters and Rural Areas**

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- **Dr. S. Ananth,**  
**Adjunct Faculty, IDRBT**

- **Dr. M. V. N. K. Prasad,**  
**Associate Professor, IDRBT**

## **Chapter 1**

### **Executive Summary**

Rapid technological change is altering the way we live and work. Mobile phones have now become an integral part of our lives. The expansion of mobile telephony accompanied by the increased penetration of smartphones has altered not only voice calling, but also the manner in which data is consumed in the smaller towns and rural areas. Increasingly, people are now using their mobiles for different activities that go beyond what was envisaged a few years ago. The study was undertaken in the two states of Andhra Pradesh (Chittoor District) and Telangana (Mahbubnagar District). The sample of respondents encompassed bank account holders who reside in three distinctive areas: district headquarters, a sub-district (mandal) headquarters and villages.

The salient features include our finding that nearly 50% of the respondents own smartphones. Contrary to a frequently held perception, mobile costing less than Rs.1000 is quite low. Invariably, the more expensive mobile phones are owned by those below 40 years and those in district and mandal headquarters. The irony of the mobile usage and mobile banking is that use of mobile internet is high, but the use of mobile banking is very low. A total of 42% of the respondents used mobile internet while only about 11% used mobile banking. The use of mobile for Music, News, Social Media and Games is predominant with nearly 42% of the respondents using their mobiles for music while a high 34% use it as a tool to gather news. The use of mobile internet is dominant among students or those below 40 years of age. There are about 15% mobile internet users in the age group 41-59 years. Almost 90% of the users of mobile internet have downloaded at least one app from the internet and the average number of apps downloaded is 16.82.

## Mobile Banking

Mobile Banking is essentially, at least presently, an urban or semi-urban phenomenon. 90% of the users fall within that category. The users from the two district headquarters account for 77% of the total users. There are no customers above 60 years who use mobile banking. The use of mobile banking among those below 25 years of age is also small – only about 16% of the total users of mobile banking. Mobile Banking is largely restricted to the more affluent sections among the banking customers. It is mostly, though not always used by consumers with income in excess of Rs.1.5 lakh.

Among those who have used mobile banking, a large number of users agree that it is easy to use. Mobile Banking is largely, at present, a convenience tool. The most important use of mobile banking is to check balance in the account rather than to transfer money. While only 50% have used mobile banking to transfer money, 95% have used it to check balance in their accounts. One of the reasons cited for the lack of a compulsive need to use mobile banking is the limitation on the size of transactions. This limits the necessity to use mobile banking and probably one of the reasons why an overwhelming number of users of mobile banking also use internet banking. In other words, mobile banking has not replaced internet banking. Rather, it supplements internet banking – even for those among the more affluent members of the sample.

The three major obstacles for the increased adoption of mobile banking include (a) lack of awareness about mobile banking, (b) mindset issues especially the preference to visit the branch for completion of their transaction and, (c) issues related to connectivity (other than mobile network connectivity) for customers. The third is important and needs to be seen in the context of an overwhelming number of customers who felt that it was easy to use but there were connectivity related issues with the bank's servers.

The study concludes by offering comprehensive suggestions including the need for banks to consider offering devices customised

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to facilitate mobile banking, banks negotiating with service providers in such a manner that there are no connectivity charges (mobile internet or talk time related) when undertaking banking operations (on lines to the present practice of no-charges incurred when dialling emergency numbers), offering digital wallet, customer education on the part of the branches at the ward or village level, offering incentives to use mobile banking and need to have a more rigorous evaluation of apps among others.

## Chapter 2

# Introduction

Technological evolution and innovation is the hallmark of human society. Each era thrives on the assumption that they are witness to momentous changes hitherto never experienced or seen. The importance of telecommunications and the rise of the internet have triggered changes that have not been seen for a long time, especially in areas that are geographically distant from the megacities or district headquarters. Expansion of mobile communications and lower cost of smartphones is facilitating the rapid spread of various applications including banking. The introduction of Apple Pay, Google Pay and Samsung Pay using Near Field Communications (NFC) along with recent patent filings that make possible person-to-person payments using electronic devices<sup>1</sup>, fingerprint readers without touch<sup>2</sup> and while Mastercard's experiment with facial recognition app for smartphone users for authentication and security in payments<sup>3</sup> indicate the transformation underway. Other reports have highlighted the impact of mobile technologies on different segments of the economy<sup>4</sup>.

The past few months have witnessed an increased push towards mobile banking by the banking sector. RBI "Payments System

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<sup>1</sup> <http://appft1.uspto.gov/netacgi/nph-Parser?Sect1=PTO1&Sect2=HITOFF&d=PG01&p=1&u=/netahtml/PTO/srchnum.html&r=1&f=G&l=50&s1=20150186887.PGNR>. (Website last visited 08 July 2015)

<sup>2</sup> <http://letstalkpayments.com/samsung-files-patent-for-a-fingerprint-reader-that-works-without-a-touch/13385/>

<sup>3</sup> <http://letstalkpayments.com/why-mastercard-is-launching-facial-scan-app-for-smartphone-users-to-make-secure-purchases/> (Website last visited 08 July 2015).

<sup>4</sup> [https://www.bcgperspectives.com/content/articles/telecommunications\\_technology\\_business\\_transformation\\_mobile\\_revolution/](https://www.bcgperspectives.com/content/articles/telecommunications_technology_business_transformation_mobile_revolution/) (Website Last visited 08 July 2015).

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Indicators” data indicates that transaction volume through mobiles has increased from Rs.3,296 crores at the end of April 2013 to Rs.18,862 crores at the end of April 2015. ICICI bank has announced that it hopes to increase transactions using a mobile by 500% in the next one year to Rs.80,000 crores while increasing the number of mobile banking customers from the present five million to ten million<sup>5</sup>. Another private sector bank, HDFC Bank, expects transactions through mobile to overtake its transactions through internet<sup>6</sup>. The public sector banks too are encouraging mobile banking.

The exponential growth in mobile usage and penetration concurrent to the expansion of the banking sector are the hallmarks of post-liberalisation India. In a short span of about two decades, TRAI data (at the end of April 2015) indicates that there are an estimated 999.71 million wireless and 26.36 million fixed ‘wireline’ connections. In April 2015, there was a net addition of 3.22 million new connections. In contrast, there is a steady erosion of fixed ‘wireline’ (‘landline’) connections in India. The number of such customers declined from 26.72 million at the end of February 2015 to 26.36 million at the end of April 2015. The number of active subscribers is estimated at 89.38% of the total subscriber base. The urban connections account for 58.01% while remaining are rural customers. India has 100.76 million broadband subscribers (85.23 million wireless and 15.52 ‘wireline’) by April 2015 – or about 12% of the population<sup>7</sup>. The monthly ‘Average Revenue Per User’ (ARPU) was Rs.118 at the end of December 2014 (the latest figures available

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<sup>5</sup> [http://www.business-standard.com/article/finance/icici-bank-looks-to-grow-its-mobile-banking-transactions-by-500-to-approx-rs-80-000-cr-in-fy16-115070700877\\_1.html](http://www.business-standard.com/article/finance/icici-bank-looks-to-grow-its-mobile-banking-transactions-by-500-to-approx-rs-80-000-cr-in-fy16-115070700877_1.html) (Website last visited 08 July 2015).

<sup>6</sup> [http://www.business-standard.com/article/finance/mobile-banking-may-overtake-internet-transactions-by-next-year-hdfc-bank-115070201264\\_1.html](http://www.business-standard.com/article/finance/mobile-banking-may-overtake-internet-transactions-by-next-year-hdfc-bank-115070201264_1.html) (Website last visited 08 July 2015)

<sup>7</sup> <http://traai.gov.in/WriteReadData/WhatsNew/Documents/PR-37-Apr-15.pdf> (Website last visited 2 July 2015)

in the public domain). The total data usage per subscriber per month increased from 68.07 MB data to 79.73 MB for GSM and from 221.26 MB to 251.93 MB for CDMA subscribers in December 2014 against the previous quarter ended September 2014<sup>8</sup>. A number of other studies and reports point to a trend of increased use of data in the country. This increased use of mobile internet is clearly visible in the regions covered by the study. In certain demographic groups, the expenditure on data exceeds expenditure on voice and text messages.

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<sup>8</sup> <http://traai.gov.in/WriteReadData/WhatsNew/Documents/PR-32-08052015.pdf>  
(Website last visited 2 July 2015)

## **Chapter 3**

### **Objectives**

The broad scope of the study is to understand the nature of mobile penetration, the readiness and willingness of the customers to use mobile banking, the problems that they face on an everyday basis. The aim of the study was to understand these in the context of the increased adoption of technology by citizens and increased investment by governments in the same. In short, the objectives of the study are as follows:

- a. Understand the nature of mobile penetration in non-metropolitan areas especially in the small towns (district headquarters and Mandal or Tehsil headquarters) and rural areas and how these compare with each other
- b. The extent and purposes for which mobile and mobile internet are used
- c. Awareness and use of mobile banking
- d. Factors impeding their use or the willingness to embrace mobile banking
- e. Suggest measures that can help create an enabling environment for the expansion of mobile banking.

## Chapter 4

### Scope of the Study, Methodology and Sample

The focus of the study was on the two districts of Chittoor (Andhra Pradesh) and Mahbubnagar (Telangana State). In these two states, the study was taken up in non-metropolitan areas on the following basis: remote underbanked Mandals<sup>9</sup> (Ghattu in Mahbubnagar district and Gudupalli in Chittoor district), Mandal headquarters which are relatively better banked (Gadwal in Mahbubnagar district and Kuppam in Chittoor district) and district headquarters (Chittoor and Mahbubnagar). All the banks were Public Sector Undertakings (PSUs) and one Regional Rural Bank<sup>10</sup>.

The study deployed two methods: structured questionnaire based survey of 200 customers of the banks including those who had registered for SMS alerts and 25 of unstructured interviews of customers of a bank as well as five interaction sessions with bank managers. The customers of the banks were chosen randomly from a list provided by one or more banks in the area. Every third name in the list provided by the bank was approached. The structured questionnaire survey sample consisted of 100 customers in each district. The details of the sample in the survey and the number of unstructured interviews are elaborated below:

Mandal	Size of Survey Sample	No of Unstructured Interviews
Chittoor District, Andhra Pradesh		
Chittoor Town (HQ)	31	6
Gudupalli (underbanked)	35	4
Kuppam (Mandal HQ)	35	5

<sup>9</sup> A sub-district is referred to as a Mandal in these two states. As an administrative unit, a Mandal is the approximate equivalent of a Tehsil. There are 661 Mandals in AP and 452 Mandals in Telangana.

<sup>10</sup> The RRB was established in 1983.

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Mahbubnagar, Telangana State		
Mahbubnagar Town (HQ)	30	3
Gadwal (Mandal & Divisional HQ)	35	3
Ghattu (underbanked)	33	4
<b>Total Size of Sample in Two States</b>	<b>199</b>	<b>25</b>

**Table 1: Details of the Sample**

A few words about the areas surveyed are in order. Among the six areas, two of them Ghattu in Mahbubnagar and Gudupalli in Chittoor have a high proportion of migratory population. Both of them are considered by their respective State Governments as extremely backward. However, the nature of migration pattern differs among these two mandals. In Ghattu, most of them migrate to Mumbai or as contract labour for the large construction or infrastructure companies. In the case of Gudupalli, most of them migrate to Bengaluru. An interesting aspect of this daily shuttling to Bengaluru and back is that most of these migrants work as daily wage, manual labour in Bengaluru or in the wholesale market of Bangarpet. These migrants make the daily trip using rail connectivity that passes through their towns and return at the end of the day.

## Chapter 5

### Profile of the Sample

The demographic profile of the mobile internet and mobile banking using population indicates an overwhelming use by those below 40 (especially 26-40) years. The following table provides details of the Mandal-wise sample:

Mandal	Less than 25	26-40	41-59	60+
Chittoor Town (31)	4	21	6	0
Gudupalli (35)	1	28	4	2
Kuppam (35)	0	30	4	1
Mahbubnagar (30)	17	7	4	2
Gadwal (35)	10	18	5	2
Ghattu (33)	0	14	15	4
Total (199)	32	118	38	11
% of Total Sample	16.08	59.29	19.09	5.52

Table 2: Age Profile of the Sample

Along with those aged less than 25 years, they comprise of the nearly two-thirds of the respondents, indicative of a good representation of the overall demography of the country. The above sample, includes both Pradhan Mantri Jan Dhan Yojana Accounts (PMJDY) and non-Jan Dhan Accounts. The PMJDY account holders comprised of about 30% (or 60 out of 199) respondents. Migrants are also covered in our study include 23.11% (or 46 respondents). It is pertinent to note that migration is prevalent not only in rural areas but also in the district headquarters – Chittoor town where respondents migrated to Bengaluru for work. A large number of respondents have two SIMs (around 65%) while 96 respondents (48.24%) use Android operating system.

A total of 26 members in the sample were female and the remaining 173 were male. Out of 199 members, 106 (53.26%) have education

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levels that are either 10+2 or beyond. In the case of women, only about six members' possessed education exceeding 10+2 level. A total of 18 members (or 10%) are illiterate in our sample while 32 members have education levels up to 10<sup>th</sup> standard. Ghattu and Gudupalli account for half of (18) such respondents. However, this number increases to 14.57% when we consider others who are barely literate or have not gone to school. Gudupalli is an interesting mandal. Though a remote area, nearly 19 of the respondents have education levels that exceed 10+2 – probably an indication of the impact of migration to Bengaluru. This could also explain the higher mobile internet usage (compared to Ghattu).

In our study, only four bank account holders (all of them Jan Dhan Account holders) did not own a mobile phone. However, in all the cases at least one member of the household owned a mobile phone. A large majority of the mobiles owned have a provision for activating internet on their mobiles. A large number of people 127 or 63.81% of the sample have at least two SIMs. Two members (mostly businessmen) have three SIMs.

The annual incomes of the respondents in the district headquarters are invariably higher. However, a large portion (39%) of respondents (Table 3) earn less than Rs.60,000 per annum. Only 9.37% of the respondents in rural areas earn more than Rs.1.5 lakh per annum.

Mandal	Less than Rs.60,000	Rs.60,001 to Rs.100,000	Rs.100,001 to Rs.1,50,000	Rs.150,001 +
Chittoor Town (31)	7	3	4	17
Gudupalli (35)	8	18	7	2
Kuppam (35)	5	8	18	4
Mahbubnagar (30)	9	11	6	4
Gadwal (35)	21	10	0	4
Ghattu (33)	28	4	0	1
Total (199)	78	54	35	32
<b>% of Total Sample</b>	<b>39.19</b>	<b>27.13</b>	<b>17.58</b>	<b>16.08</b>

(Note: Percentage may not tally due to rounding off)

**Table 3: Mandal-Wise Income Profile of Respondents**

Chapter 6

**Salient Features of Mobile Usage**

Increased use of mobile phones is a common feature. It is now not merely a useful part of our everyday life: often it is an integral part of everyday life in many parts of India, including the areas covered by this study. A recent report pointed out the role played by Facebook as a major source of information in Mizoram. The number of members in these Facebook groups exceeds the number of readers of newspapers in the State thereby making social media a major source of news and information<sup>11</sup>.

Half the respondents own mobiles that cost more than Rs.3000 while another 34% own mobiles whose cost varies from Rs.1000 to Rs.3000. The following table offers further details.

Name of Mandal	Cost of Mobile Phone (in Rs.)				
	<1000	>1001 to <3000	>3001 to <5000	>5001 to <10000	>10001
Chittoor	0	3	7	16	5
Gudupalli	4	13	6	6	2
Kuppam	7	15	6	4	3
Mahbubnagar	5	12	5	5	3
Gadwal	0	15	12	8	0
Ghattu	0	10	13	8	2
Total	16	68	49	47	15
<b>% of Total Sample</b>	<b>8.04</b>	<b>34.17</b>	<b>24.62</b>	<b>23.61</b>	<b>7.53</b>

**Table 4: Average Cost of Mobile**

<sup>11</sup> <http://www.scroll.in/article/727790/in-mizoram-facebook-groups-take-readers-where-newspapers-fail-to-tread> (website last visited July 03, 2015)

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Table 4 indicates that as in other countries internet-enabled phones is quite high. The declining cost of smartphones is largely responsible for this<sup>12</sup>. In our sample, nearly 50% of the sample have smartphones. Contrary to a frequently held perception, the cost of mobiles less than Rs.1000 (very basic phones) is quite low. However, it also indicates that the nature of internet activity (and even banking activity) that a large percentage of the population (those owning phones costing less than Rs.3000) may also have limited functionality. Hence, the banks may have to popularise options that use SMS for mobile payments. That would enable a larger coverage.

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<sup>12</sup> *In the US, the ownership rates of smart phones is 53% for households that earn between \$30,000 and \$49,999 and 47% for those earning less than \$30,000. Moreover, 30% of consumers use the mobile phone to make decisions about retail visits (<http://www.electran.org/wp-content/uploads/ETA-TT-0115.pdf>)*

Chapter 7

Mobile Internet

The fall in price of handsets, prepaid plans and competition among service providers has helped this mobile growth. The last three years witnessed a sharp increase in mobile internet usage. Basic internet connectivity is now possible with a number of relatively inexpensive phones – though the functionality is quite limited. This in turn has led to a sharp increase in use of mobile internet. Invariably, the more expensive mobile phones are owned by those below 40 years and those in district and Mandal headquarters. The following table offers an overview of the mandal-wise, age wise cost of the mobile (among mobile internet users).

	Total Sample	Age (in Years)	Cost of Mobile Phone (in Rs.)				
			<1000	>1001 to <3000	>3001 to <5000	>5001 to <10000	>10001
Chittoor Town	4	Less than 25	-	-	-	3	1
	21	26-40	-	1	2	12	3
	6	41-59	-	-	-	1	1
	0	60+	-	-	-	-	-
Gudupalli	1	Less than 25	-	-	-	-	-
	28	26-40	-	5	6	6	2
	4	41-59	-	1	-	-	-
	2	60+	-	-	-	-	-
Kuppam	0	Less than 25	-	-	-	-	-
	30	26-40	-	2	3	3	3
	4	41-59	-	1	1	1	-
	1	60+	-	-	-	-	-
Mahbubnagar Town	17	Less than 25	-	2	2	-	1
	7	26-40	-	-	2	-	1
	4	41-59	-	-	-	1	-

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	2	60+	-	-	-	-	-
Gadwal	10	Less than 25	-	1	2	2	-
	18	26-40	-	-	4	4	-
	5	41-59	-	1	1	1	-
	2	60+	-	-	-	-	-
Ghattu	0	Less than 25	-	-	-	-	-
	14	26-40	-	-	2	2	2
	15	41-59	-	-	1	1	-
	4	60+	-	-	-	-	-
Total	199		-	14	26	37	14
% of Sample				7.03	13.06	18.59	7.03

**Table 5: Mandal-Wise, Age Group-Wise, Cost of Mobile among Mobile Internet Users**

An interesting aspect of the mobile internet usage in most of the small towns and villages is that there are no mobile internet users among those who are aged above 60 years. In fact, in Mandal headquarters and villages, mobile internet is used predominant among students or those below 40 years of age. There are only 14 mobile internet users in the age group 41-59 years. The use of mobile internet among those below 25 years is prevalent but not as high as those in the age group 26-40.

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Place	Total Sample	Age (in Years)	Data Usage (in Rs.)				
			<30	31 to 100	101-150	151-300	More than 301
Chittoor Town	4	Less than 25	1	2	-	2	-
	21	26-40	3	7	-	8	-
	6	41-59	-	1	-	1	-
	0	60+	-	-	-	-	-
Gudupalli	1	Less than 25	-	-	-	-	-
	28	26-40	4	8	3	3	1
	4	41-59	-	-	-	1	-
	2	60+	-	-	-	-	-
Kuppam	0	Less than 25	-	-	-	-	-
	30	26-40	-	7	2	1	1
	4	41-59	-	3	-	-	-
	1	60+	-	-	-	-	-
Mahbubnagar Town	17	Less than 25	1	1	1	1	1
	7	26-40	-	-	2	-	1
	4	41-59	-	-	-	1	-
	2	60+	-	-	-	-	-
Gadwal	10	Less than 25	1	-	4	-	-
	18	26-40	1	5	2	-	-
	5	41-59	-	-	2	1	-
	2	60+	-	-	-	-	-
Ghattu	0	Less than 25	-	-	-	-	-
	14	26-40	1	2	2	1	-
	15	41-59	1	1	-	-	-
	4	60+	-	-	-	-	-
Total	199		13	37	18	20	4
<b>% of Total Sample</b>			<b>6.03</b>	<b>18.59</b>	<b>9.04</b>	<b>10.05</b>	<b>2.01</b>

**Table 6: Mobile Data Usage and Age Group**

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The absence of users above 60 years of age indicates that any attempt to push financial inclusion using the mobile will require a major effort that focuses on increasing awareness among people in that age group. The fact that only 53.26% of the sample has education levels that are or exceed 10+2 levels indicates that a new form of exclusion (digital exclusion) is likely to emerge in the near future that excludes those without the required skills or knowledge.

Mandal	Total No. of Mobile Internet Users	Less than Rs.60,000	Rs.60,001 to Rs.100,000	Rs.100,001 to Rs.1,50,000	Rs.150,001 +
Chittoor Town (31)	24	7 <sup>@</sup>	2	1	14
Gudupalli (35)	20	5	9	5	1
Kuppam (35)	14	1	3	8	2
Mahbubnagar (30)	9	1	4	2	2
Gadwal (35)	16	6	6	0	4
Ghattu (33)	8	4	3	0	1
Total (199)	91	24	27	16	24
<b>% of Total Sample</b>	<b>47.72</b>	<b>12.06</b>	<b>13.56</b>	<b>8.04</b>	<b>12.06</b>

(@ Income-wise categorised as others or students)

**Table 7: Income Profile of Mobile Internet Users**

Our field interviews indicate that overall technology use is rapidly altering the economy of small towns and rural areas. A combination of Cable/Satellite television, mobile internet, spread of banking, mechanisation of parts of the agricultural production along with improvement in roads and communications facilities are triggering a major shortening of the economic production and trade cycle. Invariably, technology usage varies and is more pronounced in places that are close to large cities. Chittoor, which is geographically located between two mega cities of India (Chennai and Bengaluru), obviously has higher usage. Impact of technology on the economy is best illustrated through the example of a mango pulp business owner in Chittoor town. The case of a business owner with an approximate

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annual turnover of about Rs. 4 crore is covered in greater detail in Section II.

Mobile usage for different activities tends to attest to the large-scale adoption of mobile as the most important medium for a large number of people. The use of mobile for Music, News, Social Media and Games is predominant. Nearly 42% of the sample use their mobiles for music while a high 34% use it as a tool to gather news.

Name of Mandal (Total Sample)	Use of Mobile Internet for Different Activities							
	Mobile Internet	Mobile Banking	E-commerce	Music @	News	Social/Media	Games +	Maps
Chittoor (31)	24	16	6	24	21	19	24	8
Gudupalli (35)	20	2	4	16	14	11	26	10
Kuppam (35)	14	2	4	10	10	10	23	8
Mahbubnagar (30)	9	1	1	7	3	2	6	2
Gadwal (35)	16	1	2	16	13	9	15	0
Ghattu (33)	8	0	0	10	6	3	9	0
Total (199)	91	22	17	82	67	53	103	28
% of Total Sample	<b>47.72</b>	<b>11.05</b>	<b>8.54</b>	<b>41.20</b>	<b>33.66</b>	<b>26.63</b>	<b>51.78</b>	<b>14.07</b>

@ Music downloaded or listen to music loaded on the memory card

+ Downloaded games or pre-loaded games

**Table 8: Mobile Internet Usage for Different Activities**

The data related to use of mobile internet when viewed in conjunction with Table 6 on data usage indicates that most of the users of mobile internet consume at least 1 GB of data every month (based on current data recharge packages). However, most of the usage is to download music, play games, use social media and interestingly gather news. This is an important function of mobile internet because it means that the spread of news is much faster

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than it is thought or given credence. Our data indicates that mobile internet as a source of news is high in rural areas that are distant from the district head quarters (Gudupalli, Kuppam and Gadwal). Often, it is equivalent to those in a Mandal or even district headquarters (Ghattu has higher number of respondents accessing news on mobile than its district headquarters).

Accessing news through mobile may also be connected to business requirements in these trade centres (like Gadwal and Chittoor). In Kuppam and Gudupalli, news consumption is through third party apps that allow aggregation of news feeds from different sources. In almost all the Mandals where news is accessed through the internet, our unstructured interviews indicate that users read more than one newspaper. In Kuppam, a user mentioned that he is checking messages, tracking his social media accounts and following news as long as he is awake. His data consumption is aided because his work place offers free Wi-Fi facility. These reinforce our contention that a combination of factors and impact of technology (in different spheres) is leading to a shortening of the economic and trade cycle – at least in all the villages we visited. At the present juncture, this shortening may not be impacting the whole population but its impact is substantial. However, this has not been quantified and further studies are required in this area.

Table 8 on mobile usage for various activities offers a number of useful insights. It indicates that 47% have active mobile internet connections or those who recharge their mobile internet at least once a month. Though a large part of the use of mobile internet is for playing games, listening to music, accessing news from websites and social media related activities, Gudupalli (a rural area) has a high usage of Maps – highest in the sample that exceeds the district headquarters. Ten out of the total 28 respondents who use Maps are from Gudupalli.

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Almost 82 out of the 91 users of mobile internet have downloaded at least one app from the internet and the average number of apps downloaded is 16.82<sup>13</sup>. E-commerce use is roughly equivalent to the use for banking indicative of the success of the Cash-on-Delivery model. In most cases, use of mobile banking is fed by the need to use it for various e-commerce related activities. The importance of news and use for social media is attested by the number of these applications that the younger members of the sample use. In certain villages, news applications that aggregate information from different newspapers are commonly used. In the age group of 26-40 years, we frequently came across users who use their mobile for social media or browse news whenever they have time. Our observations in the field indicate that users of mobiles and mobile internet often deploy them for interesting uses. In Kuppam, Facebook is used as an alternative to Short Messaging Services (SMS) among friends thereby saving money. In these cases, the mobile users do not even recharge their mobiles with the SMS facilities.

One inference of the above data is that frequent interaction with megacities (by way of trade, migratory population and geographic location) helps drive internet usage. The irony of Kuppam and Gudupalli Mandals is that it is better connected to Bengaluru (thanks to rail connectivity) than it is to the district head quarters (Chittoor). This is a possible explanation for the higher usage of internet in Gadwal Mandal compared to Mahbubnagar. Gadwal is a trade centre. In Kuppam, a respected local leader observed that youth with mobiles are now more aware and have increased expectations.

A large part of the data usage (Table 9) consumed indicates that usage varies from 1 GB to 3 GB per month (based on current recharge costs).

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<sup>13</sup> *However, when the top three users of apps are subtracted from the sample it is 13.83. These three users claim to have downloaded 50, 84 and 150 apps respectively. All of them are students.*

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Name of Mandal (sample)	Data Usage among Mobile Internet Users (in Rs.)					
	Less than 30	31-100	101-150	151-300	301-500	Above 501
Chittoor (31)	4	9	0	11	0	0
Gudupalli (35)	4	8	3	4	1	0
Kuppam (35)	0	10	2	1	0	1
Mahbubnagar (30)	1	1	3	2	2	0
Gadwal (35)	2	5	8	1	0	0
Ghattu (33)	2	3	2	1	0	0
Total (199)	13	36	18	20	3	1
<b>% of Total Sample</b>	<b>6.53</b>	<b>18.09</b>	<b>9.04</b>	<b>10.05</b>	<b>1.50</b>	<b>0.50</b>

**Table 9: Mandal-Wise Mobile Internet Data Recharge**

Data usage is higher in the district and Mandal headquarters. In rural areas, more than half of the respondents consumed less than Rs.100 worth of data per month (approximately about 1 GB per month). In contrast, the amount spent on data in the district headquarters by users was higher. This has substantial ramifications for the future and indicates the potential for growth of data usage in rural areas and Mandal headquarters. If the proposed government programmes like Digital India and other private initiatives to expand broadband connectivity that are in the pipeline facilitate improvements in speeds or the provision of faster broadband connectivity at the reported cost of Rs.150-250 per month for speed up to 10 MBPS then, the benefits to a large number of people under 40 years are likely to be substantial. This is likely to give a major fillip to not only mobile internet usage but also the broader economy. The time spent on browsing the internet can vary with interviewees pointing out that it varies from 2-8 hours per day. An interesting facet that a number of people pointed out is that the number of hours spent on browsing sharply increases when they are able to access wireless internet at the work place. This access is often seen as a perk that comes with their job.

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The following table indicates that among the youth mobile recharge expenditure increases when seen in conjunction with the amount spent on data (Table 10).

Name of Mandal (Total sample)	Amount Spent on Mobile Recharge Per Month (in Rs.)					
	Less than 30	31-100	101-150	151-300	301-500	Above 501
Chittoor (31)	0	2	12	16	1	0
Gudupalli (35)	1	15	2	7	2	4
Kuppam (35)	0	6	5	16	2	1
Mahbubnagar (30)	4	9	3	7	6	1
Gadwal (35)	1	4	14	7	1	8
Ghattu (33)	2	12	6	5	1	7
Total (199)	8	48	42	58	13	21
% of Total Sample	4.02	24.12	21.10	29.14	6.53	10.55

Table 10: Amount Spent on Mobile Recharge

It explains the increase in amount spent on recharge of their mobiles when voice calls are added.

The following table highlights the age wise use of mobile internet for different purposes. A large number of the users access internet for entertainment and to connect to the world. In all the areas, 26-40 users are frequent users while there is a complete absence of those aged 60 or more. Interestingly, those aged between 26-40 use their mobiles to play games more than those below 25 years of age – a classic example of ‘holier than thou attitude’.

Place	Total Sample	Age (in Years)						Banking
			Music	Games +	News	Social Media	E-commerce	
Chittoor Town	4	< 25	4	4	4	3	1	4
	21	26-40	16	23	15	14	6	10
	6	41-59	2	3	2	2	1	2
	0	60+	-	-	-	-	-	-
	1	< 25	-	-	-	-	-	-

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Gudupalli	28	26-40	15	20	13	10	4	2
	4	41-59	1	1	1	1	-	-
	2	60+	-	-	-	-	-	-
Kuppam	0	< 25	-	-	-	-	-	-
	30	26-40	9	11	9	8	3	2
	4	41-59	1	1	1	1	1	-
	1	60+	-	-	-	-	-	-
Mahbub-nagar Town	17	< 25	4	2	-	-	-	-
	7	26-40	3	2	3	2	1	1
	4	41-59	-	-	-	-	-	-
	2	60+	-	-	-	-	-	-
Gadwal	10	< 25	3	5	4	3	2	1
	18	26-40	6	7	6	5	-	-
	5	41-59	3	2	3	1	-	-
	2	60+	-	-	-	-	-	-
Ghattu	0	< 25	-	-	-	-	-	-
	14	26-40	6	6	5	2	-	-
	15	41-59	2	2	1	1	-	-
	4	60+	-	-	-	-	-	-
Total	199		76	89	67	53	19	22
			<b>38.19</b>	<b>44.72</b>	<b>33.66</b>	<b>26.63</b>	<b>9.54</b>	<b>11.05</b>

(+ Only those respondents with Mobile internet and games. Pre-loaded not counted.)

**Table 11: Age-Wise Use of Mobile and Mobile Internet**

Chapter 8

**Adoption of Mobile Banking: Field Evidence**

Mobile Banking is essentially, at least presently, an urban or semi-urban phenomenon. 90% of the users fall within that category. Chittoor Town accounts for a major part of the mobile banking customers accounting for nearly 73% of the users. The users from the two district headquarters account for 77% of the total users. There are no customers above 60 years who use mobile banking. The use of mobile banking among those below 25 years of age is also small – only about 16% of the total users of mobile banking.

Mandal	Total No of Mobile Banking Users	Less than 25 years	26-40 years	41-60 years	60+
Chittoor Town (31)	16	4	10	2	-
Gudupalli (35)	2	-	2	-	-
Kuppam (35)	2	-	2	-	-
Mahbubnagar (30)	1	-	1	-	-
Gadwal (35)	1	1	-	-	-
Ghattu (33)	0	-	-	-	-
Total (199)	22	5	15	2	-
% of Total Sample	11.05	2.51	7.53	1	-

**Table 12: Age Profile of Mobile Banking Users**

Further, mobile banking is largely an urban phenomenon that is restricted to the more affluent sections there. Mobile banking is mostly, though not always used by consumers with incomes in excess of Rs.1.5 lakh. The practicality of this cannot be missed in a country like India which is mostly a cash economy. The use of mobile banking is largely non-existent in rural areas especially in remote area the poorer sections of the populace.

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Mandal	Total No. of Mobile Banking Users	Less than Rs.60,000+	Rs.60,001 to Rs.100,000	Rs.100,001 to Rs.1,50,000	Rs.150,001 +
Chittoor Town (31)	16	6	-	-	10
Gudupalli (35)	2	1	1	-	-
Kuppam (35)	2	-	-	2	-
Mahbubnagar (30)	1	-	-	1	-
Gadwal (35)	1	-	-	-	1
Ghattu (33)	0	-	-	-	-
Total (199)	22	7*	1	3	11
<b>% of Total Sample</b>	<b>11.05</b>	<b>3.51</b>	<b>0.50</b>	<b>1.50</b>	<b>5.52</b>

(\*All five have reported zero incomes. Mostly students or housewives)

**Table 13: Income Profile of Mobile Banking Users**

Unfortunately, factors that correlate high mobile phone ownership and usage like average customer age and household incomes do not mean an automatic success for the adoption of mobile banking – at least, in India. Transactions using the mobile (as RBI data indicates) are miniscule of the total banking transactions. Our study indicates that only about 11% of the sample use mobile banking – that too occasionally. Mobile banking is, presently, a phenomenon largely restricted to a small group of educated, young population in the urban areas. The two district headquarters account for 77% of the total mobile banking uses while nearly 73% are from Chittoor Town (Population about 1.6 lakh). The district and Mandal headquarters account for 91% (or 20 out of 22 respondents). The only other rural area that has mobile banking customers are from Gudupalli. In the district and Mandal headquarters, mobile banking is largely restricted to those who are either well educated or those who with substantial surplus funds at their disposal.

Name of Mandal (sample size)	Mobile Banking	Weekly Once	Weekly 4-5 times	Fortnight	Occasionally
Chittoor (31)	16	1	1	5	9
Gudupalli (35)	2	1	-	-	1

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Kuppam (35)	2	-	-	-	2
Mahbubnagar (30)	1	1	-	-	-
Gadwal (35)	1	1	-	-	-
Ghattu (33)	0	-	-	-	-
Total (199)	22	4	1	5	12
<b>% of Total Sample</b>	<b>11.05</b>	<b>2.01</b>	<b>0.50</b>	<b>1</b>	<b>6.03</b>

**Table 14: Mobile Banking and Frequency of Usage**

Table 14 indicates that use of mobile banking, when in vogue, is used occasionally (usually indicative of use once in more than 15 days).

The customer experience of mobile banking indicates that almost 85% of the users (17 out of 21 users) agree that it is easy to use (Table 17). But, the usage of mobile banking has not picked up due to other reasons dealt later in this report. The most important use of mobile banking is to check balance in the account rather than to transfer money. While only 50% of those who claim to have used mobile banking have transferred money, 95% have used it to check balance in their accounts. There are likely to be two reasons: (1) mobile banking is more of a convenience tool that is used by customers in times of urgency rather than a primary tool and, (2) most of the users of mobile banking also use online banking facility. Since most of the banks offer only few services, it is likely that there is no compulsive need to use mobile banking. A businessman in Chittoor Town complained that though he would like to use mobile banking but, the limitation on the size of transaction and problems with his bank force him to avoid it. He notes that at least three or four times a month, he regrets that he is not able to use his mobile for undertaking large transactions (around Rs.5 lakh or above) through his mobile. Interestingly, a large number of mobile banking users also use internet banking (Table 15). In other words, mobile banking has not replaced internet banking. Rather, it supplements internet banking – even for those among the more affluent members of the sample. A larger number of people use internet banking for their transactions (transfer money) rather than use mobiles for

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transferring money. One of the reasons for this may be the limited number of services offered through mobile banking.

Name of Mandal (sample size)	Mobile Banking	Check Balance	Transfer Money	Internet (online) Transactions	Easy to Use
Chittoor (31)	16	15	5	10	11
Gudupalli (35)	2	2	1	1	2
Kuppam (35)	2	2	2	1	2
Mahbubnagar (30)	1	1	1	1	1
Gadwal (35)	1	1	1	1	1
Ghattu (33)	0	-	-	-	-
Total (199)	22	21	10	14	17
% of Total Sample	11.05	10.55	5.02	7.03	8.54

**Table 15: Nature of Mobile Banking Operations**

One interesting case in Ghattu needs special mention. The case is important for this study because it may indicate that the actual number of users of mobile banking can exceed those indicated in our survey – if it is a predominant trend. In this particular case, a person uses his mobile to help others transact use his mobile but the person himself does not use mobile banking. The person (a local journalist with a vernacular newspaper) has helped at least five members (mostly friends and relatives) check their balance using his mobile since those of the customers do not support.

This study indicates that the challenge for the banks is manifold in nature. First, adoption of mobile banking requires a change in mindset – especially when people do not use various data services. Second, in cases where data services are used (especially by the younger members of society), the banks need to convince customers in rural and small towns about the compulsive need to use mobile banking. There is a need for the banks to convince more users in all age and income groups to use mobile banking more frequently and use it for a larger variety of transactions rather than to check their account balances. But, for that the banks need to permit all types of

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transactions or most of transactions and services through the mobile banking platform apart from designing a customised suite of products and services. The responses of mobile internet users indicate that the banks have a herculean task expanding mobile banking usage. This is not to solely place the fault at the doorstep of the banks – about 7% of the customers pointed out that they did not have the required surplus that gives them the luxury of the need to frequently use their account.

A major problem is that a large number of people do not even know that it was possible or they simply lack awareness about the possibility of mobile banking (Table 16).

Name of Mandal (sample size)	Did Not Know it Was Possible	Mobile/Network Connectivity Issues	Prefer Branch	Safety Fears	No Awareness of Mobile Banking Product	No Money and No Need
Chittoor (31)	16	1	9	5	13	-
Gudupalli (35)	2	4	6	2	19	8
Kuppam (35)	4	12	13	0	27	6
Mahbubnagar (30)	21	3	1	3	17	-
Gadwal (35)	31	8	16	12	24	-
Ghattu (33)	28	2	14	13	17	-
Total (199)	102	30	59	35	117	14
% of Total Sample	51.25	15.07	29.64	17.58	58.79	7.03

(Note: In the above table, multiple responses were sought)

**Table 16: Reasons for not using Mobile Banking**

Nearly half of the respondents did not know that mobile banking was possible and about 59% had no awareness about its uses or how to use it. Chittoor town presents a study in contrast. While about half the respondents use/used mobile banking the other half did not know that it was possible. This is repeated in the district headquarters, Mandal headquarters and the villages. Thus, the problem of awareness among users is across the regions. Connectivity seems to aggravate this problem. While network

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connectivity is not an issue in the district headquarters, in Mandal headquarters and rural areas it was an issue.

The mindset issues are clearly indicated by the fact that a large number of people (nearly 30%) prefer to visit the branch to undertake their transactions rather than use the convenience of mobile banking. This high percentage of people creates a problem for banks looking to decongest their branches. This is ironic considering that in most of the places bank branches are unable to provide services due to the large number of customers who flock the branches. In the rural areas of both the districts, a visit to these rural branches is clearly visible.

In certain places, information asymmetry and attendant problems have led to the rise of people exploiting bank customers. In Ghattu, a bank manager complained that it is common for the more educated people to charge a fee for helping illiterate withdraw their money or to complete other banking transactions. Despite this, there are no mobile banking users in Ghattu.

### Chapter 9

## Customer Experience

One of the obstacles to increased adoption of mobile banking may lie in issues related to connectivity (other than mobile network connectivity) for customers. While an overwhelming number of customers felt that it was easy to use, many of the users are plagued with issues relating to connectivity (with the bank's servers) and related problems frequently. That may be one of the reasons why many of the customers of mobile banking (especially in Chittoor town) use internet banking. Almost all the respondents agreed that the transactions were completed in less than five minutes. But frequent inability to complete the transaction on one attempt due to connectivity issue is a matter that requires urgent attention on the part of the banks.

A majority of the respondents who use mobile banking felt that dispute resolution was good or satisfactory. Interestingly, that dispute resolution is not a problem for users thereby indicating that the perceived fears related to security is largely misplaced. Thus, there are many reasons why the banks need to invest in customer education to overcome fears and negative perceptions related to mobile banking.

One problem that has often been cited is the perception (perceived and grounded in reality) that mobile banking transactions are best avoided because grievance redressal is difficult. Customers believe, mostly wrongly, that bank staff will not help them when there is a problem. Bank managers aver that they have immediately looked into any of the complaints, especially those related to mobile banking due to reputational risks involved.

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	Chittoor (31)*	Gudupalli (35)*	Kuppam (35)*	Mahabub- nagar (30)*	Gadwal (35)*	Ghattu (33)*
<b>Ease of Use</b>						
Yes	12	2	2	1	1	1
No	1					
Can't Say	2					
<b>Transaction Time</b>						
Less than 3 min.	5	2		1		
3-5 min.	5		2		1	
More than 5 min.	3					3
<b>Dispute Resolution</b>				N/A		
Excellent	1					
Good	7					
Satisfactory	5				1	1
Not Satisfied						
Poor						
<b>Connectivity During Transaction</b>						
Not over in one attempt	12		1			
Frequent Problems		2				2
Sometimes Problem			1			
No Problems					4	
Don't Remember	2					

(\*Size of Sample in Brackets)

**Table 17: Mobile Banking Customer Experience**

A technical issue that was cited by a user during the course of unstructured interviews in Chittoor town was that he was discouraged to use mobile banking because one can retain/view the details of the last transaction in the cache (history area) in offline data connection mode. This worries many business owners since some of the transactions are not reported or can be between

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individuals who use bank accounts of family members or different bank accounts but in the same branch or with the same bank.

The problems related to mobile banking adoption means that it may be necessary for the banks to reconsider the practice of offering mobile banking services by default when accounts are opened. It will help if the banks can take up intensive awareness programmes and even some form of practical 'tutorial' type contact programmes at the community level.

### ***Interesting Observations based on Survey Data***

- a. Only eight female respondents (out of 26) use mobile internet. All of them are located in our district or Mandal headquarters (four in Chittoor, two in Kuppam, two in Mahbubnagar town). Seven of these women are salaried employees. Only two of them undertake business
- b. All the female respondents possess educational qualifications that exceed 10+2 level. Two of them have college education
- c. Six of the female respondents use mobile internet for games, five for music, three for social media, five for news, one uses Maps
- d. Three female respondents use mobile banking use mobile banking. All three use it to check balance. Two of the three mobile banking users also use internet banking
- e. Only 17 of the 46 respondents who migrate for work have a PMJDY account
- f. The preferred mode of channelizing earning back home by the migrants was either by carrying cash, sending it through friends or family and banks – indicative of the banks replacing commission agents in the money transfer business
- g. 71 respondents (35.67% of total sample) recharge their mobiles weekly once; 54 (27.13%) recharge more than once a week; 50 (25.12%) once in a fortnight and 17 (8.54%) once in a month
- h. A majority (103 or 51.75%) of the bank accounts were opened after 1<sup>st</sup> January 2010

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- i. Twelve PMJDY accounts were opened before 2010 – indicative of banks converting their existing accounts to PMJDY accounts. The oldest such account dates back to 1992
- j. Six PMJDY account holders possess mobiles that cost more than Rs.10,001. All of them use mobile internet and three of them use mobile banking. All of them are from district headquarters (Chittoor).

## **Section II**

# **Conclusions & Suggestions**

Globally, technology companies are rapidly emerging as a major challenge to the established banks in the realm of payments and even lending (peer-to-peer lending). As our study clearly highlights, customers of banks are not avid users of mobile banking though they use their mobiles for many other purposes some of which were inconceivable a few years ago.

### **Conclusions**

- A. Mobile banking adoption has been slow (only 11% of the total respondents) and clearly lags behind mobile internet use which is as high as 48% of the sample. Only 16% of those below 25 years use mobile banking – while 43% use mobile internet. The adoption of mobile banking in the age group 41-59 is only nominal (7% or 14 out of 199 respondents). This leaves tremendous scope for increased usage of mobile banking.
  
- B. The demographic profile of India is conducive to long-term investments. 87% of India's population is below 54 years while 46.6% of the country's population is below 24 years. Our sample consists of 75.37% below 40 years of age. Considering the demographic profile of India's population and nearly 48% using mobile internet, improving the mobile banking delivery channel has the potential to offer large benefits to the banking sector by way of improved profitability and increased consumer satisfaction while concurrently facilitating financial inclusion in the long-term.
  
- C. Mobile Internet usage is largely restricted to those below 40 years (Table 10). There are often innovative ways in which mobile

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internet is used. The most popular use of mobile internet among the 47.72% of the users includes games (51.78%), music (41.20%), news (33.66%), social media (26.63), maps (14.07) and mobile banking (11.05%) respectively. There are more users of Maps than mobile banking. Mobile internet also helps, to an extent, in overcoming information asymmetry. There is a high degree of correlation between incomes, education and mobile banking usage.

- D. Mobile banking largely remains an urban phenomenon that is mostly restricted to the district headquarters or the Mandal headquarters and restricted to the more affluent sections. Ninety per cent of the users are from the two district headquarters with one district headquarters contributing about 77% of the total users of mobile banking. The usage in rural areas is extremely low (10%).
- E. The frequency of mobile banking use leaves much to be desired. A large part (55%) of those transacting through mobile do so only occasionally (one transaction once in a month or beyond 15 days). An overwhelming number of customers use it to check balance in their accounts (95%) while only 45% have transferred money. A large number of customers (64%) use internet banking. Hence, mobile banking complements internet banking rather than replacing internet banking.
- F. Almost 77% of the respondents pointed out that mobile banking is easy to use. However, a majority of the mobile banking customers (55%) complained that they could not complete their transactions in one attempt. Among those who did not use mobile banking a major issue is that either they do not know that it was possible or they do not have awareness about it (51% and 59% respectively). Mindset issues are also responsible for customers not embracing mobile banking with 30% of the

respondents pointing out that they prefer to bank with the branch. Hence, there are two major obstacles: (a) technical issues related connectivity to the bank while using the application and second the clear lack of awareness. Both, these are not unsurmountable.

- G. Migrants comprise of about 23% of the sample. A large number of them use either friends, family or banks to transfer money. These three modes of transfer of money has completely replaced the informal money transfer agents for internal remittances.

### Suggestions

- A. There is a need for banks to consider the larger changes like shortening of trade and economic cycle thanks to the use of technology. Harnessing these changes through a combination of strategies including use of internet, mobile and conventional banking at the branches has potential banks to further expand their reach. This reach is best possible if the banks offer mobile devices that are customised to facilitate banking operations. Using NFC tags and biometrics stored in the device is can ease transactions.
- B. In order to facilitate connectivity and minimise the cost of this connectivity, banks can negotiate with service providers in such a manner that there are no connectivity charges (mobile internet or talk time related) when undertaking banking operations. These can be on similar lines to the present practice of no-charges incurred when dialling emergency numbers. The government can consider subsidising the telecommunications service providers for offer such services. Such incentives can be more effective if they are initially tried/experimented in rural areas, especially those that are distant from the district headquarters. Such incentives will be helpful as 40% of the mobiles owned by the respondents cost less than Rs.3000. A large number of these phones are

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owned by those with little formal education. There is a need for banks to consider offering an instrument that is ready for mobile banking.

- C. The cause of mobile banking will be further helped if the above-mentioned customised instruments can offer various services that include a 'digital wallet' and facilitate one-touch bill payments which directly receive and use the proceeds of Direct Benefits Transfer (DBT) to the mobile.
- D. The lack of awareness is a serious issue that requires special efforts by the branches to reach out to customers. This can be achieved if the banks use awareness campaigns at the village/block/ward level. These awareness campaigns can be targeted to attract students and other youngsters. These awareness campaigns can concentrate on not just the advantages of using mobile banking but also safety features, grievance redressal mechanism and other aspects related to customer education.
- E. There is a perception that the banks are unresponsive or it is difficult to resolve disputes. These could include waiving charges or even marketing strategies that are offered by many other retail players through cross-selling or discounts. It was often pointed out that one of the attractions for Paytm is that it allows a comparison of various prepaid packages. Banks can consider offering such information services. Since music and news are important uses for mobile internet, offering incentives or special access (or even a reward like paid subscription) for those using mobile banking to access or downloading music and news website is a possible marketing strategy.
- F. A larger linking of various government departments to encourage mobile transfers especially for paying various bills could be a useful way. This will encourage the creation of a larger digital

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ecosystem and help the move towards digital transactions. Creating a large network in the local area that links various users and merchants can create the basis for people and businesses to complete their daily transactions electronically, while the government can help by transferring all the benefits to one or a few accounts. The existence and ease of using bank accounts in the local area means that people need not pay cash for their transactions.

- G. There is an urgent need for some banks to overcome technical issues so that mobile banking becomes more attractive for use among customers. In certain cases, connecting to the bank's server and completing the transaction on one attempt is an issue. In the case cited above, privacy concerns (reported static page view about the details of the last transaction in offline mode) aggravate existing fear psychosis about security in mobile banking.
- H. Banks should consider a more rigorous app evaluation and test before release to consumers. They should use the services of specialised institutions like IDRBT that have experience such testing. This can facilitate the creation of enable the creation of market ready.
- I. There is an urgent need for the banks to encourage increased frequency of the banks and to increase money transfer using mobile. Presently, mobile banking is largely to check the balance followed by a relatively low usage for money transfers.
- J. It is important to note that mobile connectivity is still expensive. Increased adoption of mobile banking is possible if the government and the banks can make efforts to invest in free Wi-Fi access, especially in rural areas.

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- K. There is a need for banks to encourage basic banking activities and money transfers using short messages. Pictographic user interface (or directions) combined with voice directions about use of mobile banking will probably benefit a large number of people who cannot read or write. An intensive awareness programme aimed at encouraging banking activities using short message may help those with phones with limited functionality (non smartphones), migrants and those with little or no formal education. In certain cases, mobile apps in the local language can be overcome the fear of navigating technology and the fear of mistaken activities.

**Annexure I**

**Geographic Profile of the Areas in the Study**

**Profile of District Headquarters**

	Chittoor Town	Mahbubnagar Town
Population	160722	190400
Male	80060	96142
Female	80662	94258
Number of Households	41000	37886

*Population statistics: Census 2011*

**Profile of Mandal Headquarters**

	Kuppam (Chittoor)	Gadwal (Mahbubnagar)
Population	21963	63177
Male	11091	31935
Female	10872	31242
Number of Households	NA	NA

*Population statistics: Census 2011*

**Profile of Rural Mandals**

	Gudupalli (Chittoor)	Ghattu (Mahbubnagar)
Population	1976	6658
Male	1026	3047
Female	950	3611
Number of Households	470	1216

*Population statistics: Census 2011*

**Annexure II**

**Mobile Technology Adoption: Interesting Cases<sup>14</sup>**

**Case 1: A Medium and Small Business Owner (Chittoor Town)**

The person owns a mango pulp business. He sells his product to a major AP-based group which in turn exports the pulp to Gulf Countries. The stated annual turnover of his business is in the region of Rs.3-4 crore per annum. The family has interests in the construction sector in Bengaluru and they have recently entered into apartment constructions in Chittoor. He uses a Xiaomi dual-sim phone, which cost him Rs.28,000. The person uses prepaid BSNL for his mobile internet. He uses the Rs.68 prepaid data plan which allows him 1 GB validity for 10 days. The owner uses the mobile for a large part of his business requirements. Their seasonal business requires extensive travel and organizing purchase of raw material (mangoes) and converting the purchased mangoes to pulp.

The person uses his mobile for almost everything – except banking. Their ability to scour the internet using their mobile is considered to be a major advantage since it is convenient and allows them to work while travelling. A major use of the mobile phone is their ability to access information related to their business, especially business-to-business (B2B) websites and order any spare parts or other requirements. Most of the orders are through e-commerce sites after comparing different products in different websites. Most of these are ordered using the cash-on-delivery mode. According to him, e-commerce and if necessary payment through mobile has brought the person major benefits to a number of people in Chittoor: it has removed an intermediary and allows them to purchase genuine parts from the manufacturer. In the past, the purchase of spare parts had to be through “brokers” (intermediaries)

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<sup>14</sup> All names in this section have been withheld on request.

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based in Chittoor town. These brokers would place orders in different cities. Though the delivery time has not changed drastically (shortened by a day or two), the advantage is that they are now assured of genuineness of parts and a satisfaction that they got the best deal in the market since they order after comparing it in various websites. More importantly, the purchases are about 20% cheaper thereby allowing them to increase their own margins. His orders are delivered by Speed Post of the Department of Posts.

The person however is not keen to use mobile banking though he does use it sometimes for small transactions since the app retains the full details of the last transaction in offline mode. This is a worry because in case of theft or loss of mobile, there is a risk that his account details will be exposed.

### **Case 2: Kirana Shop Owner (Gudupalli Village, Chittoor district)**

An interesting case of usage of mobile internet is indicated by the owner of a small kirana shop in Gudupalli Village (also the Mandal headquarters). A post-graduate, in his early 30s, he worked for a few years as an office attendant in a Bengaluru office after his attempt to gain meaningful employment failed. A hobby of the person since the time of his under-graduation was to collect coins and currency notes of different countries. Initially, he started collecting them from friends and relatives. Gradually, he started buying them from anybody who either advertised their sale, from shops or through somebody who brought it to his notice. The currency notes and coins in his collection now exceed those from 100 countries including those like Tsarist Russia, Rhodesia and erstwhile Soviet Bloc countries. His investments exceed Rs.50,000. In recent years, most of the collection has grown through purchases from other collectors. He claims that he had one disadvantage when purchasing coins and currency notes: he does not know their value and the seller (frequently other collectors) often overcharged him. He now uses Google Search on his mobile to check the present value of a

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currency, converts it to Indian Rupees and bargains around the estimated present value. This is convenient as he can bargain and search for information at the same time by using mobile internet. By using mobile internet, he claims to save a substantial amount of money every year.

The person does not use mobile banking. The most important reason is because bankers “never respond properly” to any request for information.

### **Case 3: Cultural Activist (Mahbubnagar Town)**

The use of mobile internet by a cultural activist in Yadira (formerly a village but merged into Mahbubnagar town about a year ago) offers different facets of internet usage in small towns and rural areas. Ten friends formed a cultural troupe a few years ago out of interest. This has gradually emerged into their occupation. Their work entails touring different villages and deploying folk songs to spread awareness on different issues. The nature of issues can vary from social issues, salient features or advantages of government programmes and political propaganda. They are usually hired by NGOs, government agencies, banks and during elections, political parties. The payments that they receive are based on the type of agency hiring them. It varies from Rs.500 to Rs.1000 per day per person. Political parties pay them handsomely – when needed in the few months before the 2014 elections a regional party paid each person Rs.50,000 per month plus accommodation and other expenses.

This particular member uses mobile internet to search for folk songs on YouTube and Google. The tune and content of these songs found through these searches are modified to suit their needs. They use the mobile to record their own performance and dispatch these video clips to NGOs and other prospective clients or even as advertisement for their ability. Similarly, all their work-done reports

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(videos and photos) that are required to be submitted to the agency that hires them are completed using the mobile. In the past they had to hire a videographer, copy it onto a Compact Disk (CD) and dispatch the CD by courier – an expensive and time consuming process. Now, all the activities including the issue of press notes, publicity and other are completed using their mobiles. The troupe uses a number of mobile apps to edit their photos – most of these were conducted over a personal computer in the past and had to be paid.

The person spends about Rs.500 on mobile internet recharge and about Rs.100 on voice recharge per month. He has a facility where his service provider (Vodafone) offers free internet between 2.00 PM to 4.00 PM. His mobile internet charges cited above are over and above the free two hours that he always uses. Interestingly, though they were hired for an awareness programme about Jan Dhan by a local RRB, they rarely use the bank account.

### **Case 4: School Teacher in Ghattu**

The use of mobile internet by a government school teacher who also helps his brother run a e-Seva Kendra (common service centre) in Ghattu village yet another facet of the use of mobile internet. The person in his late 20s works as a school teacher in a government school in Ijara located 15 kilometers from Ghattu. He makes the daily trip from Ghattu to his school. His family invested Rs.1.2 lakh in the e-Seva. There are three such e-Seva Kendras in the village (estimated population of about 6,658). His mobile (Moto G) cost Rs.11,999 and was purchased on Flipkart (the e-commerce website).

A frequent user of various social media applications, he spends nearly Rs.500 per month on data and Rs.200 on voice. The most frequent applications that he uses are Facebook, WhatsApp, Twitter and Viber. He is a frequent user of e-commerce website like Snapdeal and Flipkart. He uses mobile banking but that is mostly to

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recharge his account in Paytm. That in turn helps his business. They prefer and use internet banking as they are connected to the internet for the e-Seva related activities. All the purchases on e-commerce websites are paid using his debit cards. However, connectivity is a major problem. Any power cut means that connectivity is disrupted. During the time when he is not in school, he uses the internet for 3-4 hours while on other days like holidays he uses it for about 1-2 hours. WhatsApp is particular useful for them as they use it to transfer any files (like government orders) and other information. He tracks almost all the Telugu newspapers (e-papers).

An interesting aspect of e-commerce payments is that the package is delivered to a friend's address in Gadwal because there is a no delivery in Ghattu. The friend in turn passes on the package to taxi drivers (20 seater jeeps) or owners who operate services from Ghattu to Gadwal. He operates two bank accounts – State Bank of Hyderabad (salary account) and with State Bank of India which he opened as a student. The use of mobile banking is not frequent for two reasons: (a) connected to internet due to their e-Seva business and (b) a fear that a failed transaction may lead to loss of money since they have no knowledge about the dispute resolution process.

**Annexure III**

**Questionnaire**

**1. Personal Identification Details**

1.1. Name of the Respondent \_\_\_\_\_

1.2. Habitation \_\_\_\_\_

1.3. Panchayat \_\_\_\_\_

1.4. Mandal \_\_\_\_\_

1.5. District \_\_\_\_\_

1.6. Age\_\_\_\_\_

1.7. Sex\_\_\_\_\_ (1=Male, 2=Female)

1.8. Marital Status:\_\_\_\_\_

1=unmarried, 2=married, 3=widowed, 4=divorced, 5 =separated,  
6=others, 7 = NA

1.9. Aadhaar Number \_\_\_\_\_

1.10. Educational Background and Income:

Particulars	Response
Educational Qualifications 1=Illiterate; 2=literate; 3=No Schooling, 4=Up to 7 <sup>th</sup> / Elementary; 5= Up to 10 <sup>th</sup> / Secondary; 6= Up to Intermediate; 7=College, 8=Others.	

1.11. Primary Occupation of Member: \_\_\_\_\_

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(1=Agricultural Wage Labour, 2= Agriculture, 3= Non-Agricultural Wage Labour, 4=Own Business, 5=Non-farm Activity, 6= Salaried Employee, 7=Housewife, 8=Unemployed, 9=Pensioner, 10=Others)

### 1.12. Employment/Earnings Related Details:

Particulars of Employment	Number of Days Employed in a Year	Earnings (Multiply no. of days with amount earned per day)	Nature of Employment
From Primary Source of Employment			
Incomes from Other Sources			

(1=Daily Wage Labour, 2 = Agriculture, 3=Salaried Employee, 4= Contract Employee, 5= Migratory Labour, 6=Self Employed, 7=Students, 8=Pensioner, 9=Others)

### 1.13. Migration Related:

		Response
1.13.1	Do you migrate for work at any time in the year (Yes=1; No=2)	
1.13.2	Number of days in a year that you migrate for work (1=Less than one month, 2=One to three months, 3=Only during summer, 4=Three to six months a year, 5=More than 6 months, 6=All year, 7=None, 8=Others)	
1.13.3	Place where you migrate for work (1=Neighbouring district, 2=Hyderabad, 3=Other cities in the state, 4=Out of the State, 5=Mumbai, 6= Gulf; 7=Others)	
1.13.4	Mode of Remitting Money, if necessary (1= Carry cash, 2=Friends & Family, 3=Agents,	

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	4=Banks/BC, 5= Money transfer companies, 6=Hawala channels, 7=Others, 8=Never send home money)	
1.13.5	Cost of Remitting Money (1=Less than 1%, 2=More than 1% but less than 5%, 3=More than 5% but <10%, 4=More than 10%, 5=Others)	
1.13.6	Do you use money transfer through mobile (bank or other apps) 1=Yes; 2 No; 3=Don't even know it exists	
1.13.7	Any Other Information	

1.14. Do you have a Jan Dhan Bank Account \_\_\_\_\_ (1=Yes; 2=No)

1.15. Name of Bank and Branch \_\_\_\_\_

1.16. Date of Opening of the Bank Account(s) \_\_\_\_\_.

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### 2. Mobile Related Details

#### 2.1. Mobile Possession and Related Details

	Particulars	Response
2.1.1	First Purchase (Year)	
2.1.2	Number of SIM Cards	
2.1.3	Cost of Mobile (in Rs) 1= Less than 1,000; 2=1001 to 3000; 3 = 3001 to 5000; 4=5001 to 10000; 5= 10,001 to 30,000; 6 = More than 30,000	
2.1.4	Name of Manufacturer 1=Samsung; 2=Nokia; 3=Micromax; 4=Celkon; 5=Motorola; 6=Others	
2.1.5	Model Name & No.	
2.1.6	Service Provider 1= BSNL; 2=Airtel; 3=Aircel; 4=Vodafone; 5=Idea; 6=Videocon; 7=Uninor; 8=Others	
2.1.7	Nature of Connection (Post Paid =1; Prepaid=2)	
2.1.8	Operating System Android =1; iOS=2; Others=3	
2.1.9	Average Monthly Expenditure on Mobile (in Rs.) 1= less than 10; 2=11 to 30; 3=31 to 50; 4=51 to 100; 5=101 to 150; 6=151 to 300; 7=301 to 500; 8=more than Rs.500	
2.1.10	Average Amount of Each Recharge (if Prepaid) 1= Less than 10; 2 = 11 to 30; 3=31 to 50; 4=51 to 100; 5=101 to 150; 6=151 to 300; 7=301 to 500; 8=More than Rs.500	
2.1.11	Average Frequency of Recharge (1= More than once a week; 2=Weekly; 3=Fortnightly, 4=Monthly; 5=Others)	
2.1.12	Availability of Internet in Mobile (Yes =1; No = 2)	
2.1.13	Amount Spent on Data/Mobile Internet per	

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	Month (in Rs.) 1= Less than 10; 2 = 11 to 30; 3=31 to 50; 4=51 to 100; 5 = 101 to 150; 6=151 to 300; 7=301 to 500; 8=More than Rs.500	
2.1.14	Any Other Information	

**2.2. Data Plan Details (speed/etc.):** \_\_\_\_\_

### 2.3. Frequency of Operations Used by Respondent

(More than once a day =1; Avg of once a day = 2, Three to 7 times a week =3; Seven to 10 times a week = 4; More than 10 times a week =5; Once a month = 6; Occasionally =7; Other = 8; Never =9)

	Frequency of Operations	Response
2.3.1	Receive Voice Calls only	
2.3.2	Make Voice Calls Only	
2.3.3	Send and Receive SMS	
2.3.4	Receive SMS only	
2.3.5	Don't Know how to read SMS	
2.3.6	Listen to Radio	
2.3.7	Download Music and Videos	
2.3.8	Social Media (Twitter, Facebook, etc)	
2.3.9	Other Apps (Whatsapp, Viber, etc)	
2.3.10	Search for Information	
2.3.11	Play Games	
2.3.12	Mobile Banking	
2.3.13	E-Commerce or Purchases	
2.3.14	GPS/Maps	
2.3.15	Camera /Video	
2.3.16	Others	

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2.4. Approximate No. of apps downloaded in till date \_\_\_\_\_

2.5. No. of apps used on a daily basis \_\_\_\_\_

2.6. Mobile Banking/Payment Related and Type of Mobile Banking/Payment Activity

	Particulars Mobile Banking Activity	Response (Yes =1; No = 2)
2.6.1	Do you undertake mobile banking	
2.6.2	Have you downloaded mobile app of a bank	
2.6.3	Use it to check balance in account	
2.6.4	Use it to transfer money	
2.6.5	Use it for other banking services	
2.6.6	Have you used IMPS	
2.6.7	Have you used payment services using SMS	
2.6.8	Have you used payments using any USSD based services	
2.6.9	Have you used payments using the bank website (online)	
2.6.10	Others (Pls. specify)	

2.7. If you have used or use Mobile Banking/Payment

	Particulars of Customer Feedback	Response
2.7.1	Ease of use of mobile banking/ (1=Yes; 2 No; 3 Can't say)	
2.7.2	Completion of Transaction (1=Excellent; 2=Good; 3=Average; 4=Poor, 5=Not user friendly)	

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2.7.3	Time taken to complete transaction (1= Less than 3 minutes; 2=3 to 5 minutes; 3=More than 5 minutes)	
2.7.4	Connectivity while transacting (1=Never able to complete transaction in one attempt; 2=Frequent problems; 3=Sometimes; 4=Never; 5=Don't remember).	
2.7.5	Ease of transaction using a mobile (1= Yes; 2 = No; 3 = Can't say)	
2.7.6	Customer Complaint/Redressal Process (1= Excellent; 2=Good, 3=Average/Not sure; 4 = Dissatisfied; 5 = Poor; 6 = Others)	
2.7.7	Do you help others or recommend others to use mobile banking/payments (1=Yes; 2= No)	
2.7.8	Others (Pls. specify)	

### 2.8. If you are not using or never used Mobile Banking

	Reasons for not using Mobile Banking	Response (Yes=1; No =2)
2.8.1	Do not know that is possible	
2.8.2	Bandwidth is costly	
2.8.3	Prefer visiting the branch to complete transaction	
2.8.4	Poor connectivity	
2.8.5	Poor data connectivity	
2.8.6	No internet connection on handset	
2.8.7	Tried but it crashed so stopped using	
2.8.8	Takes too much time	
2.8.9	Worried about security	
2.8.10	Lack of trust	
2.8.11	Too complicated/cumbersome	

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2.8.12	Lack of awareness	
2.8.13	Have asked for help from bank employees but did not receive help	
2.8.14	Others (specify)	
2.8.15	All the above	

### 2.9. If using mobile banking, average frequency of usage

	<b>Average Frequency of Use</b>	<b>Response (Yes=1; No =2)</b>
2.9.1	More than once a day	
2.9.2	Once a day	
2.9.3	Once a week	
2.9.4	4-5 times a week	
2.9.5	More than 5 times a week	
2.9.6	Fortnightly	
2.9.7	Occasionally (more than fortnightly)	
2.9.8	Never	

## Frameworks from IDRBT

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1. Data Quality Framework
2. Cloud Security Framework
3. Green Banking Framework
4. Social Media Framework
5. Information Security Framework
6. Information Security Governance
7. Holistic CRM and Analytics
8. Organizational Structure for IT
9. Micro-ATM Standards

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All the above mentioned Frameworks can be downloaded from [www.idrbt.ac.in/bp.html](http://www.idrbt.ac.in/bp.html)



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## Institute for Development and Research in Banking Technology

(Established by Reserve Bank of India)

Castle Hills, Road No. 1, Masab Tank, Hyderabad - 500057.

EPABX : +91 - 40 - 23294999, Fax : +91 - 40 - 23535157

Web : [www.idrbt.ac.in](http://www.idrbt.ac.in) E-mail : [publisher@idrbt.ac.in](mailto:publisher@idrbt.ac.in)