# The Modern Banking Technology in and around India: Benefits and Challenges

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# ABSTRACT

Online banking, a little known concept so far has soon taken centre stage. So, it's imperative for us to understand that online banking is all about doing banking transactions over the NET. E- Banking is a concept which will enable anyone to conduct business with a bank from the comforts of the home or office. Indian Banks are still in the process of exploring the potentials of the internet as a medium for the banking as the technology heading towards more business, there are potential prospects of internet banking. As the world becomes increasingly more digital, the number of passwords people have to manage is becoming a serious problem. Financial institutions need to investigate acceptable biometric alternatives for authenticating mobile banking users that balance both security and simplicity. So, this paper throws light on new innovations in banking sector. The main factors limiting consumer adoption of mobile banking and payments were a preference for using other methods for banking or making payments and security concerns.

Keywords: Online banking; Technology; Biometric mobile banking.

### **1.0 Objectives of the Research Paper**

- To appreciate the various innovative banking products/services being offered by the banks across the globe.
- To examine the various technologies that can help banks in offering various innovative banking products/services in the future
- To find out the leaders in banking innovations among public sector banks and private sector banks in India
- To understand what are the challenges of implementing digital banking

### 2.0 Research Methodology

The research is mainly based on secondary data. Data has been collected from different sources like annual reports of selected banks, scholarly articles, newsletters, and various web sites.

### **3.0 Literature Review**

As per the "Consumers and Mobile Financial Services 2016" survey report, Use of mobile banking continues to rise. Forty three percent of all mobile phone owners with a bank account had used mobile banking in the 12 months prior to the survey, up from 39 percent in 2014 and 33 percent in 2013.

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Among those with a mobile phone, 42 percent think that people's personal information is "very unsafe" or "somewhat unsafe" when they use mobile banking and an additional 15 percent "don't know" how safe these activities are.

The main factors limiting consumer adoption of mobile banking and payments were a preference for using other methods for banking or making payments and security concerns.

A Paper published in "The Wall street Journal" by Paul Lee, partner and head of global technology, media, and telecommunications (TMT) research, Deloitte Touche Tohmatsu Limited, said that by 2020, smart-phone users across the world would have 200 online accounts and would be very difficult to remember strong & complex password. In his paper Paul Lee quoted that Deloitte Global expects fingerprint readers to become as ubiquitous in Smartphone's as front-facing cameras and to be a common part of other devices as well, ranging from laptop computers to remote control devices and will replace password readers.

Gareth W. Peters & Efstathios Panayi (November, 2015) in their research paper "Understanding Modern Banking Ledgers through Blockchain Technologies: Future of Transaction Processing and Smart Contracts on the Internet of Money", the block chain technology has potential to disrupt the world of banking through facilitating global money remittance, smart contracts, automated banking ledgers and digital assets. They said that a number of features that are vital from a financial application perspective, including permissioning, data integrity, data security and data authenticity as well as important regulatory requirements relating to account provisioning for financial asset reporting, and the blockchain aspects that can help adhere to these.

A white paper published by Banking Expert survey 2017 concluded few findings:

- Large banks of developed countries like USA, UK, Germany, and Switzerland, digital transformation strategy was already implemented or in development.
- Main driver for the strategy is to meet customer expectations followed by financial aspects in terms of revenue increases and reduction of operational costs
- Main challenges of an implementation are perceived in the integration of legacy systems, security & privacy implications and lack of internal expertis.

Meenu Gupte, in her research article – Indian Banking System – Journey from Traditional to Digital talked about the digital innovation in India like Electronic Fund Transfer, Net Electronic Funds Transfer, Real time Gross Settlement, Immediate Payment Interface, Unstructured Supplementary Service Data, Mobile Banking, Mobile Wallets, etc. She argued in her research paper that it is critical opportunity for the banking sector to compete with emerging banks by implementing innovative technology.

Sreelatha, T and Sekhar C (2012) observed in their study that the banks were quickly responded to the changes in the industry; especially the new generation banks. The continuance of the trend has re-defined and re-engineered the banking operations as whole with more customization through leveraging technology. As technology makes banking convenient, customers can access banking services and do banking transactions any time and from any ware.

Harish V (2014) in his study argues that Information Technology (IT) has revolutionized the entire banking business spectrum and banking is no exception .IT can be suitably used in brick/mortal as well as virtual set up. IT has in short become the lifeline of banking.

### 4.0 Advantages of Modern Banking Technology

The recent liberalization trend and globalization has brought many changes in business practices and economic systems in the world. Consequently, the banking sector and other financial institutions are also affected by new realties following globalization. This is the age of internet banking. Indian banks have already started offering web- based banking services to the account holders. Online banking has proved successful in the international banking sector in other countries and has revolutionized the E-commerce industry Innovative Banking Technology Across the globe:

# 4.1 Advantage of modern banking technology

# 4.1.1 To the bankers

- Bankers can provide customer friendly services to customer almost 24x7
- Banks are going bigger; they can increase their scale as physical presence may not be important.
- Deposits can be sent through the mail and withdrawals can be made via competing bank ATMs, with the possibility of having certain ATM fees waived. Since they don't have to maintain physical branches or hire as many employees, online banks can keep costs incredibly low and pass certain savings on to customers
- Technological progress may also affect industry structure, facilitating consolidation by making it more efficient or less inefficient at the margin for banks to be larger, more geographically dispersed, and/or to engage in M&A activity.
- Geographical expansion of banking industry

# 4.1.2 To the customers

- You can check your account balance, review recent transaction, transfer funds, pay bills, locate ATMs, deposit cheques, manage investments, etc. Mobile banking is available round the clock 24/7/365, it is easy and convenient and an ideal choice for accessing financial services for most mobile phone owners in the rural areas.
- Time saving: Instead of allocating time to walk into a bank, you can check account balances, schedule and receive payments, transfer money and organize your accounts when you're on the go.
- Convenient: The ability to access bank accounts, make payments, and even track investments regardless of where you are can Convenient: The ability to access bank accounts, make payments, and even track investments regardless of where you are can

### 5.0 Emerging Banking Technology across the Globe

### **5.1 Biometrics technology**

As the world becomes increasingly more digital, the number of passwords people have to manage is becoming a serious problem. Financial institutions need to investigate acceptable biometric alternatives for authenticating mobile banking users that balance both security and simplicity.

Biometric technology is any means by which a person can be uniquely identified by evaluating one or more distinguishing biological traits. Biometric authentication includes fingerprints; DNA, face, hand, retina and ear features. Biometrics systems could end the need of password and PIN code. According to the BBC, Hongkong and Shanghai Banking Corporation (HSBC) is launching voice and touch recognition security services in the UK. British banking firm Barclays also upped security in 2014 – offering finger vein scanning for authentication of large transactions. HSBC bank has adapted facial recognition technology.

Biometric authentication systems are not 100% accurate. There are two types of errors in a typical biometric system. A false reject (FR) error is the rejection of an authorized person trying to access the system. A false accept (FA) error is the acceptance of a person who is not in fact who he or she claims to be. These two types of errors are inversely proportional and in general can be controlled

by a confidence threshold. To increase the security of the system, the threshold can be increased, which decreases FA errors and increases FR errors.

### 5.1.1 Advantages of biometric systems

- Improved security
- Improved customer experience
- Cannot be forgotten or lost
- Reduced operational costs

### 5.1.2 Disadvantages of biometric systems

- Environment and usage can affect measurements
- Systems are not 100% accurate
- Require integration and/or additional hardware
- Cannot be reset once compromised

Few banks in India have also started implementing biometrics devises for their customers:

- CB Bank has set up ATMs that require your fingerprints to withdraw money. The ATM operates using Aadhaar card data and links a customer's fingerprint data with his Aadhaar biometric details. These biometric ATMs are available in Bengaluru, Mumbai and Chennai. However, this service can only be availed by DCB Bank customers.
- HDFC Bank is reaching out to rural areas which don't have ATMs through a hand-held device or a micro ATM with biometric verification. It uses Aadhaar card and fingerprints for biometric verification for instant KYC (know your customer) check. HDFC has tied up with Gramin Banking Officers (GBO) to provide this facility in Punjab.
- SBI uses a biometrics authentication application that incorporates fingerprints and biometric matching software to verify bank employee credentials before they access sits core banking system. The bank will install this system across 21,000 locations.

### 5.2 Wearable technology

While the world is still embracing mobile innovation and determining additional use cases for adoption, wearable technology is building upon this foundation to directly embed the power of the Smartphone on a person. Despite the various form factors that wearable's can have—from smart watches to augmented-reality glasses to clothing—they provide a less distracting layer that gives a user constant intelligence about the world around them before they may even know they need it. It can also help businesses engage with customers, perhaps better than ever before.

In a survey of McKinsey, Wearable technology can create economic impact of up to US\$6.2 trillion annually by 2025. Traditional uses of wearable technologies are for mobile industrial inspection, maintenance and the military. Consumer uses include display peripherals, computer-ready clothing and smart fabrics. And banks are starting to take note.

### 5.2.1 Google glass technology

Banco Sabadell in Spain became one of the first banks to create retail Google app that allowed users to locate the nearest ATM, check account balances, and use video conferencing for technical support. Spanish financial firm, Caixa Bank has also already developed a Google Glass app. It works by super imposing directions to the nearest branch onto the Glass screen, providing information such distance and phone number of the nearest branch, all of which is accessed through the voice recognition system.

# 5.2.2 Augmented reality(AR) apps

Augmented Reality (AR) is a method of enhancing and improving your view of the real world using different technologies. It is the integration of digital information with the user's environment in real time. Australian Bank Westpac announced the release of an augmented reality app for mobile devices. Commonwealth Bank of Australia and St George Bank Australia also adopted this technology.

# 5.2.3 Scenario of wearable technology in India

- HDFC bank has leveraged the popularity of wearable devices in the country and has launched 'watch banking' with its Apple watch. The bank will provide all its banking services through all wearable devices across platforms like iOS and Android. "HDFC Bank will provide a total of 10 banking transactions in the current launch phase. Some of them being View Account Information, Bill Payments, Recharges, hot listing facilities, locate nearest branch, ATM, offer, request statement and chequebook among other," said the bank in a statement.
- ICICI Bank\_had launched iWear in year 2015, an application for smart watches. This is available for Android watch users and can be downloaded from the Google Playstore. ICICI Bank introduced voice recognition for its customers to transact smoothly through the bank's call centre. Customers are no longer required to enter their PIN and card number as their voice will act as the password now. The voice recognition technology authenticates based on speed, accent and pronunciation, which are unique to every individual.

# 5.3 Branchless banking

According to BCG report, the number of internet users is set to increase from estimated 350 million now to 500 million by 2018. Moreover, 60 percent of internet users are moving to vernacular language in small towns/villages using their mobiles to transact. Nowadays, for customers of the banks, banking is important – not physical banking. The proliferation of banking touch points driven by technology as a part of outreach has been gaining traction.

The benefits of this strategic change in banking about the physical presence of banks with a view to

- Extend smart digital outreach -24/7
- Reduce operational costs more particularly when net interest margins are coming down
- Redeploy these spared off staff to more profitable location
- Fear up to serve next generation customers in the way they need to be served
- Align branch network policy with global development

### 5.4 In-car apps

Spanish financial institution Caixa Bank has created the first mobile banking app that can be accessed while driving, using voice control functionality. Drivers can make balance enquiries and transfers, as well as locate nearby branches and ATMs, by speaking into their Android device. Many car manufacturers like Genreal Motors, Jaguar, Honda, Shell, etc have made started research on in car application as part of IoT (BoT).

### 5.5 Beacon technology

Beacon devices transmit information in the form of Bluetooth low-energy (BLE) signals to the nearby Bluetooth enabled smart devices like iPhone, Android phones, iPad, phablets, tablets and more. Beacon transactions consist of only three values namely UUID, a major and a minor value. For example, consider a user entering in to a store or a retail shop with a beacon app installed on their smart-phone. Whenever they come across a broadcaster (beacon device), it detects the small packet of data transferred from the broadcaster. Triggered information can be of anything like offers, details about the product, deals and coupons and more.

Bluetooth Beacons installed at banks to integrate physical and mobile channels, to create a new type of interaction and effective commercial communication and to deliver to the customers a positive and personal experience. Barclays is one of the first bank to use this technology. Other banks which were interested in Beacon Technolgy were Citi Bank, US Bank, St. Geroge Bank (Australia), DenizBank (Istanbul), etc.

Bluetooth Beacon hardware, mobile middleware for iOS and Android and a very powerful cloud platform, is able to monitor and manage the content and the interactions, to gather analytics and measure results, and to efficiently administrate the hardware infrastructure.

Beacon Technology can provide services like Presence Detection, Customer ID Recognition, Welcome Interaction, Desk and Clerk Allocation, Notifying Account Managers, Tailored Financial Offers, Up-Selling and Education, Cross-selling and New Income, Branch Analytics, Satisfaction Surveys, Mobile Payments and Contextual Advertising.

#### 5.6 Artificial intelligence (AI)

Artificial intelligence is an area of computer science that emphasizes the creation of intelligent machines that work and reacts like humans. Computers can perform activities like speech recognition, Learning, Planning and Problem solving with AI.

As per the prediction of Accenture, AI will become the primary way banks interact with their customers within the next three years from the bankers' survey performed by consultancy Accenture.

The use of intelligent digital assistants is now common in some of the more developed banking markets like US, Japan and Hongkong. The self-learning capabilities of these programs help them get better with every subsequent interaction.

#### 5.6.1 Scenario of AI in banking sector in India

- Several Indian banks have started exploring adoption of artificial intelligence (AI) and machine learning (ML) in their operational processes. Like, SBI, ICICI, HDFC, Yes Bank has started using AI.
- Banking operations are highly process oriented and data intensive. Hence, AI can help to carry out process for bankers and analyze huge volumes of information about a client's behaviour to offer them detailed, personalised in format. For example, YES BANK is betting on AI powered BOTS, Technology to usher 'Digital Transformation of Retail loans'. YES BANK, through these transformative digitization initiatives, is ensuring seamless integration of digital utilities with core retail loan processing systems, thereby enabling a digitized workflow for Retail Assets product offerings and eliminating paperwork.

### 5.7 Oculus rift

Rift is advanced display technology combined with its precise; low-latency constellation tracking system enables the sensation of presence. The US bank has been testing the use of Oculus Rift virtual reality headsets at its Digital Labs in San Francisco, offering customers the ability to virtually 'enter a branch and speak to a teller face to face.

#### 5.8 Block chain technology

"A Blockchain is a digital, immutable, distributed ledger that chronologically records transactions in near real time. The prerequisite for each subsequent transaction to be added to the

ledger is the respective consensus of the network participants (called nodes), thereby creating a continuous mechanism of control regarding manipulation, errors, and data quality.

### 5.8.1 Key characteristics of the Blockchain

- All the information on Blockchain is digitized, eliminating the need for manual documentation.
- Blockchain, as the name suggests is a chain of blocks each being a repository that stores information pertaining to a transaction and also links to the previous block in the same transaction. These connected blocks form a chronological chain providing a trail of the underlying transaction.
- Blocks created are cryptographically sealed in the chain. This means that it become impossible to delete, edit or copy already created blocks and put it on network, thereby creating true digital assets and ensuring a high level of robustness and trust.
- Furthermore, the decentralized storage in a Blockchain is known to be very failure-resistant. Even in the event of the failure of a large number of network participants, the Blockchain remains available, eliminating the single point of failure. Data stored in a Blockchain is immutable.
- A transaction on Blockchain can be executed only if all the parties on the network unanimously approve it. However, consensus based rules can be altered to suit various circumstances.
- Indistinguishable copies of all information are shared on the Blockchain. Participants independently validate information without a centralized authority.
- Even if one node fails, the remaining nodes continue to operate, ensuring no disruption

# 5.8.2 Block Chain in Banking

The Indian banking industry today is faced with issues such as rising costs of operations, increasing susceptibility to fraudulent attacks on centralized servers and challenges in ensuring transparency. All this, primarily because most of the banking transactions – from opening customer accounts to making global payments – may require intensive manual processing and documentation, involve costly intermediaries and is time consuming as these transactions need

### 5.8.3 What are banks looking for?

Banks are continuously exploring new ways to perform transactions quicker for an enhanced customer service, while ensuring cost efficiency in its operations and assuring transparency to customers and regulators.

For this, Blockchain potentially provides a solution for banks as it inherently helps eliminate intermediaries, maintain immutable log of transactions and also facilitates real-time execution of transactions. This could potentially reduce the TAT for banking transaction, reducing costs of manual work, and leading to enhanced customer service and satisfaction. Like any other industry, choosing the right 'use case' is the key for Banks to leverage full value of Block-chain.

### 5.8.4 Circumstances or types of transaction where BCT can be used

- Too much manual paper work is involved
- Transaction should be performed on real time basis
- Intermediaries are charging heavily
- Multiple parties are involved in the transaction
- Data are being stored in multiple locations and data consistency issues are there

### 5.8.5 In banking various transaction having all the features

• Vendor Financing

- Customer Loyalty Program
- Sydicated Loans

#### 6.0 Issues in Implementation of Modern Banking Technology

Banking sector is facing major competition from non-bank players in P2P payments, real-time payments, and other growing sectors. Consumers expect all businesses to adapt to their changing needs with the same speed and agility as they have come to expect from the tech industry, leaving banks to play a complicated game of catch-up with more nimble technology pioneers. Hence, banking sector is facing tremendous pressure in recent time.

#### 6.1 The payment challenge

One of the key challenges facing banks is the impact of disruptive new technologies on their retail payments business – the so-called "rise of the FinTech". Such competition from non-banks in retail payments services is of course not new. Western Union and Moneygram, for example, are well-established non-bank providers. But what is different now is that various factors are coinciding which look set to fundamentally change the landscape of the retail payments market, and in ways that threaten banks' dominant market position.

#### 6.2 The replacement of legacy

Replacing legacy systems, however, is a costly and risky undertaking that involves a lot of cooperation across multiple divisions, departments, and sometimes even countries. One strategy being explored by some to address large infrastructure issues is to implement small-scale solutions to improve data sharing and communication between existing systems. While such solutions may work in certain situations, they commonly create an environment of even greater technological complication, especially when targeted solutions are designed and implemented by disparate third-party providers.

#### 6.3 Security issues

Continuous growth of data breaches remains a major threat to the banking firms as aggressiveness of the cyber-attack have increased from malware to ransom ware and banking Trojan.

The wake-up call, though, has been the attempted heist in the Bangladeshi central bank. In February 2016, cyber thieves had issued instructions to transfer \$951 million out of Bangladesh Bank's account at the New York Federal Reserve. While most were declined, an amount of \$81 million was transferred to a bank in the Philippines, never to be traced again. The theft sent shock waves through the global banking community, both for the amount of money that was swindled and how the heist leveraged the Society for Worldwide Interbank Financial Telecommunication (Swift) system, the backbone of international finance.

There are many threats related to payment services, from malware to social engineering related threats. Few threats and mitigating controls has been listed.

#### 6.3.1 Denial of service

*Denial-of-Service* (DoS) attack is an attempt to make a system / application or network resource unavailable to its users for their intended purposes, such as to interrupt or suspend services of a host connected to the Internet.

It usually consists of a concerted effort by one or multiple persons / systems to prevent an Internet site or service from functioning normally. Recent developments show that Internet of Things

(IoT) devices are often not sufficiently secured and can well be infected by criminal organisations in order to "participate" in a Distributed DoS attack.

### 6.3.2 Social engineering

Social engineering is a primarily non-technical method of intrusion used by attackers to target users to provide access and information rather than the attacker directly attacking the system.

Social engineering attacks range from mass email attempts that can be relatively easy to identify as an attempt to defraud a customer, through to attacks that target one or two individuals in an organisation and impersonate senior employees within that organisation, an attack known as CEO Fraud or Business Email Compromise (BEC).

### 6.3.3 Malware

Malware comes in a wide range of flavours, such as vira, worms, remote access tools, rootkits, Trojans, spyware and adware. The latest addition to the malware family is ransomware, also known as cryptoware. Malware exploits software vulnerabilities in browsers, third party software and operating systems to gain access to the device and its information and resources.

### 6.3.4 Mobile device related attacks

The use of mobile devices for both online banking and the purchase of goods and services (both online and in person) is still increasing. With this increase in usage there is a corresponding increase in the threats affecting these payments.

Main threats include:

- Malicious apps purporting to be banking apps;
- SIM swap based attacks;
- To exploit new contactless payment methods in which a traditional payment mechanism, e.g. a credit card, is stored on a mobile device for contactless transactions
- Phishing attacks specifically targeting the mobile device;
- Malware infecting the mobile device, compromising the legitimate use of the device and stealing credentials etc.;

Many other threats weaken the security of the banking payment system. Indian Banking industry should take stringent steps to stops these threats .Banks should form security control framework. Framework would identify major threats; the risk related to the particular threat and also should mention about mitigating control of that threat.

Banks should also increase awareness among the customers related to the threats and should give them guidelines on how to safeguard their mobile devices, IoT devices, online banking transactions, etc.

### 6.4 Lack of technology experts

For an industry that depends on security more than any other industry in the world, financial services companies are lacking when it comes to understanding technology in banking. A recent document put out by Accenture.com states that among 109 of the largest banks in the world, 43% don't have any board members with professional technology backgrounds and only 3% of their CEO's have a background in technology. When it comes to understanding security concerns and implementing truly impactful strategies to evolve and adapt to the ever-changing landscape of technology in banking, these numbers are quite alarming to us.

Financial Services IT consulting services are definitely needed in the banking industry to help key decision makers improve digital processes and understand their risks.

# 7.0 Conclusion

Indian banks have adopted innovative & modern banking technology at fast pace. Both public sector and private sector banks have already implemented the e-banking facilities. These technology driven services are going to make jobs easy for bonkers as well as customers. But adoption of this technology by customer is still questionable. This hesitance in adoption of new technology may due to trust factors, security and privacy risk and also because of less awareness among customers. Banking sector along with Government is making an effort to make e-banking more safe, secure and reliable. This paper only presents the overview of Modern Banking Technology in Indian Context.

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