ICT Innovation in Indian Banking Sector: Trends and Challenges

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Abstract: *Today, digital technologies are evolving at an unprecedented rate all across the globe. India, too is witnessing radical growth in Information and Communication Technology at a very rapid pace. As a result, Indian Banking sector is undergoing huge transformation to offer better and enhanced services to its customers. Continuous innovation in ICT in the banking domain has made Virtual Banking a reality in India. Establishment of Innovation Labs is facilitating the banks to explore various avenues in the banking arena like Biometrics, Artificial Intelligence, Robotics, Data Analytics, Wearable technology etc. Digital wallets have already paved the way for cashless transactions. As the nation welcomes innovations in ICT, banks need to equip themselves with the required infrastructure. As significant proportion of educated urban youth in the nation accepts and adopts virtual banking, banks need to take efforts to reach out to uneducated rural poor too. As the nation witnesses promising ICT trends in next generation banking, banks also need to prepare a blueprint to overcome the challenges posed. This research paper undertakes the study of application of ICT in order to make the entire banking experience consumer centric. The study also highlights the application of emerging technology in few select banks in India. It also lists the challenges posed by innovations in ICT and suggests alternatives to overcome the same. This paper is descriptive in nature. Secondary data are collected from various websites, reports and journals.*

Keywords: *ICT, Innovation, Biometrics, Artificial Intelligence, Technology*

I. Introduction

Information and Communications Technology or ICT is the infrastructure and components that enable modern computing. It refers to the convergence of audio-visual and telephone networks with computer networks. ICT facilitates interaction of people and organizations in digital world. ICT innovation in Indian banking sector has laid strong foundation of modern banking services. There has been a paradigm shift in the offerings made to the consumers. The expectations of tech savvy customers have increased manifold in last few years. Net Banking, digital wallets, mobile banking apps is the way of life of such customers who move around without any hard cash in their pockets. Emerging technologies will certainly take Indian banking to the next level in near future.

The emerging trends will delight its tech savvy customers for sure, but will these banking services even reach rural customers? While the banks and customers completely start relying on technology, will the transactions be 100% secure? As banks adopt Artificial Intelligence and automation with Robotics, will minimal or no human control over transactions ensure security of data? This paper seeks to study the trends and challenges posed by ICT innovation in Indian banking sector.

II. Objectives

- To study the emerging technology in Indian Banking Sector
- To study the challenges posed by ICT innovation in near future
- To suggest alternatives to overcome the challenges

III. Scope

The study covers the technological developments in Indian banking sector only.

IV. Methodology

The study is descriptive in nature and is based on secondary data. The data are collected from various reports, journals, news articles, various bank portals, RBI portal and internet sources.

V. Discussion

5.1. TRENDS – Emerging Technology in Indian Banking Sector

5.1.1. FinTech Services

FinTech means Financial Technology, i.e. offering financial services by making use of modern technology. FinTech companies compete with the banking sector today to provide financial services to the customers. Large

number of FinTech Startups have emerged in India and the nation is moving towards establishing itself as a global FinTech hub.

Facts and Figures of FinTech Market - India :

(Source - https://www.statista.com/outlook/295/119/fintech/india#)

Transaction Value in the "FinTech" market amounts to US$44,068m in 2017.

Transaction Value is expected to show an annual growth rate (CAGR 2017-2021) of 20.2% resulting in the total amount of US$91,999m in 2021.

The market's largest segment is the segment "Digital Payments" with a total transaction value of US$43,831m in 2017

5.1.2. Innovation Labs

As the FinTech Startups are paving way for stiff competition to the traditional banking services, many banks have adopted proactive strategy by establishing their own internal innovation labs. Innovation labs operate with the primary objective of evaluating and adopting emerging technologies and contribute to bank's motive of digitalization.

Eg: AXIS Bank has set up its Innovation Lab named Thought Factory.

5.1.3. Yearwise growth in the use of electronic payment systems

Fig.1 depicts the use of various electronic payment systems. As the awareness is growing, customers are increasingly opting for e-payment systems. The confidence in transacting through digital platforms has been generated over time and banks need to assure the security in using such services.
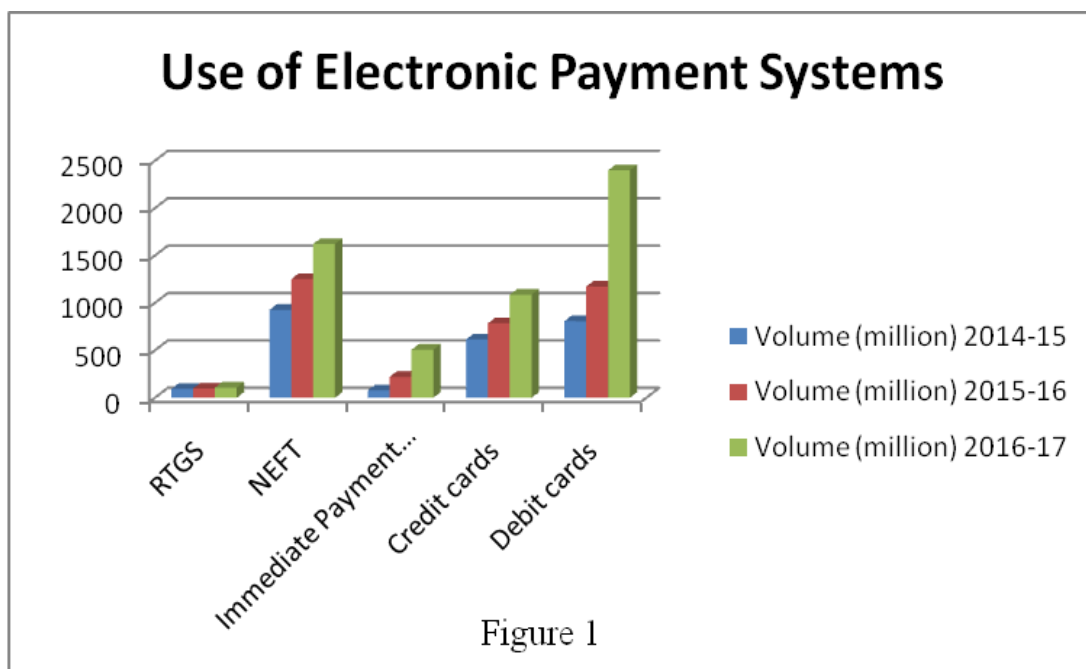

Figure 1 - Growth in use of electronic payment systems

(Source: https://rbi.org.in/scripts/AnnualReportPublications.aspx?Id=1209, Table IX.1 Payment System Indicators – Annual Turnover)

5.1.4. UPI

National Payments Corporation of India (NPCI) launched Unified Payments Interface (UPI) in 2016 with 21 member banks. UPI is a system that powers multiple bank accounts into a single mobile application, merging several banking features and seamless fund routing. UPI has been considered as the revolutionary product in payment system.

5.1.5. Digital Wallets

Digital Wallets allow an individual to make electronic transactions using a smartphone. Awareness and use of e-wallets increased post demonitisation in India. It is indeed one step towards 'less cash' economy.

Examples of top digital wallets and UPI apps in India

- Paytm
- BHIM App
- Mobiwik
- FreeCharge
- Oxigen
- ICICI Pockets
- PhonePe
- Jio Money
- State Bank Buddy
- Vodafone M-Pesa
- Chillr
- Citrus Wallet
- LIME
- CitiMasterPass
- mRupee
- Trupay
- Airtel money
- MomoXpress
- Ezetap

5.1.6. Wearable Technology

'To wear your bank on your wrist' is a reality today. Smart watch banking helps the customers check their balance, get fraud alerts, carry out both financial and information transactions and offers many more services, all on their wrist.

In India, ICICI has launched an app named iWear for all smart watches. ICICI is among few global players allowing transactions using this app on both Apple and Android platforms.

As technology is redefining banking, wearable banking and transactions via smart watches and smart glasses is gearing up as a key trend.

5.1.7. Artificial Intelligence and Robotics

Indian banking sector is heavily investing in automation via Robotics and Artificial Intelligence (AI). Intelligent machines are being deployed to cater to every need of today's modern tech savvy customer.
Examples:
i) Kumbakonam based City Union Bank launched India's first banking robot Lakshmi which is powered by AI in Nov 2016. All the generic questions are answered aloud while sensitive information pertaining to the customer is displayed on robot's screen.
ii) ICICI deployed Software Robots in its over 200 business processes in 2016. These software robots have reduced the response time to customers by upto 60% and increased accuracy to 100%.
iii) HDFC launched Intelligent Robotic Assistant (IRA) in one of its Mumbai branches. This IRA guides the customers towards various banking operations within the branch.
iv) DIGI Bank – India's first mobile-only digital bank
DIGI Bank by DBS Bank - Singapore's largest bank and a leading bank in Asia, has proved to be a milestone in the field of AI enabled banking services in India. DBS launched India's first mobile-only bank in 2016 – DIGI Bank. Unlike traditional banks it is completely paper-less, signature-less and branchless bank. It's the only virtual bank powered by AI where customer authentication is done using Aadhaar card.
v) Examples of Chatbot (Chat robot – a computer programme that simulates human conversation through AI) launched by few banks in India

Table 1 – Examples of Chatbot

Name of the Bank	CHATBOT
SBI	SIA
ICICI	iPal
HDFC	EVA
Yes Bank	YES TAG
DIGI Bank	Digor

5.1.8. The 3 Big B's

The 3 Big B's prominently trending today in Indian banking sector are Biometrics, Blockchain and Big Data Analytics.

India is experiencing revolutionary transformation in the banking sector in the presence of these 3 Big B's.

i) Biometrics

As netizens adopt digital way of life, remembering multiple passwords for authentication is becoming a herculean task. Biometrics overcomes this problem. Voice pattern, fingerprints, iris scans, facial geometry are being replaced by passwords to establish user's identity and simplify the login process while banking online or via a mobile device. Biometrics technology makes use of biological data and behavioural characteristics that differentiates one human being from another. Biometrics is secure and cost effective method for authentication process of the customers of the bank. It eliminates the burden of remembering passwords, PINs and card numbers.

Present day applications in India

Table 2 – Biometrics application in Indian banking sector

Biometrics type	Example
Fingerprint	UIDAI uses fingerprints to issue Aadhaar numbers. DCB has set up ATMs in Bengaluru, Mumbai, Chennai that require fingerprints to withdraw money. The ATM operates using Aadhaar card data and links a customer's fingerprint data with his Aadhaar biometric details. HDFC is reaching out to rural areas with micro ATMs (handheld device). Fingerprints are used for instant authentication. SBI uses fingerprints to verify bank employee credentials.
Voice Recognition	ICICI Bank introduced voice recognition for its customers to transact smoothly through the bank's call center. Voice of the customer acts as the password. The voice recognition technology uses speed, accent and pronunciation for authentication, which are unique to every individual
Face Recognition	Federal bank has introduced zero balance selfie account which uses an app (Feedback), scanned PAN, Aadhaar details and a selfie to open an account instantly. App gets converted into a passbook once the account is opened.
Iris Scan	UIDAI also uses Iris scan to issue Aadhaar numbers

Biometrics authentication is difficult to mimic but at the same time easy for all people to use. It offers convenience to customers, operational efficiency to the banks and secures the transactions.

ii) Blockchain

The functioning of Bitcoin is based on Blockchain technology. Bitcoin is digital currency that allows the user to perform peer to peer transactions without the help of a third party such as banks. A blockchain is a data structure that is used to create a digital ledger of transactions and share it among a distributed network of computers. The underlying principle used is cryptography, wherein each participant on the network is allowed to manipulate the ledger in a secure way without the need for a central authority.

Present day applications in India

In October 2016, ICICI Bank carried out India's first international trade transaction and overseas remittances using blockchain technology. ICICI partnered with Dubai's largest bank Emirates NBD for this project.

AXIS Bank and YES Bank too are working on blockchain technology.

Startups exploring blockchain technology –

Primechain Technologies has created a Bankchain for banks to explore, build and implement blockchain solutions in various areas of banking. More than 20 banks, one being SBI, are members and are seeking the benefits offered by this startup.

Signzy, another startup is using blockchain with AI to enable banks to authenticate and identify a person in few hours.

The Reserve Bank of India too has successfully tested blockhain technology for trade application.

Benefits of Blockchain

- Shared Control
- Reliable and high quality data
- Faster transactions
- Provides audit trail
- Transparency and process integrity

Scope

Blockchain technology offers identity authentication through a visible ledger and has potential to reduce cyber risks

It offers huge potential to Indian banks to garner remittances from across the globe

Indian banks can use blockchain to introduce automation across trade-finance, remittances, funds transfer, open account transactions and identity services around KYC and secure documents space.

iii) Big Data Analytics

Big Data are said to be extremely huge data set that has to be analysed, handled, managed and validated through typical data management tools. Indian banks have millions of customers. The data of these customers is stored in the database. Retrieving the data in meaningful manner becomes a complex process as many times the data collected is unorganized. Big Data Analytics helps in resolving this problem.

The analytics tools gives the bank insights into personal habits of its customers, allowing it to promote offers accordingly. To achieve competitive edge in today's modern banking era, banks in India are using data analytics to attract new customers, retain them and make the entire process consumer centric.

Present day applications

Table 3 – Big Data Analytics application in Indian banking sector

Bank Name	Main focus of using Analytics
HDFC	To get a complete picture of the customer
ICICI Bank	To reduce credit losses
AXIS bank	For Customer Intelligence and Risk Management
ING Vysya Bank (now acquired by Kotak Mahindra Bank)	Data Modelling and Neural Network Scoring Engine
SBI	Applying data models to education loans, automotive loans, housing loans, SME loans to try and reduce the percentage of them going bad

Facts and Figures – Analytics in India

Analytics market in India stands at approx $1.64 billion annually in revenues, growing at a healthy rate of 28.8% CAGR

Finance and Banking form the largest sector being served by analytics in India. Of the total revenue earned by analytics industry in India, 35% or $575 million comes from Finance and Banking.
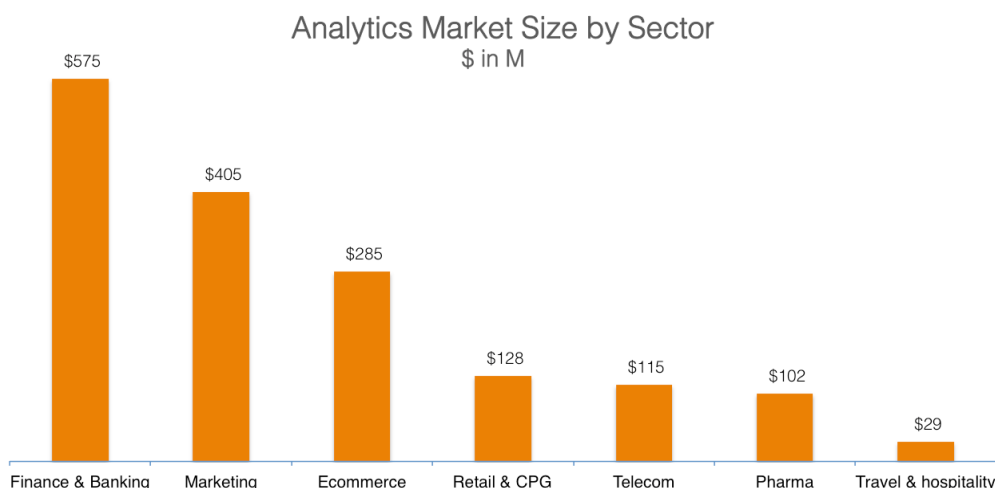

Figure 2 – Sector wise Analytics market size

(Source: https://analyticsindiamag.com/analytics-india-industry-study-2016/)

Banking in India is bound to revolve around diffusion of these 3 Big B's. Biometrics, Blockchain and Big Data Analytics are the milestones in Indian Banking scenario and will positively change the interface of banking industry.

The role of automation via Robotics and AI cannot be undermined. Robotics + AI + 3 Big B's = BIG opportunities. These innovations will have India establish many more 'mobile only banks' in near future.

5.2. CHALLENGES
5.2.1. Automation and AI may lead to unemployment
AI and automation are the major breakthroughs of today's innovation era. Although the benefits are promising, technology revolution poses a great threat to many of the jobs which will be completely automated and opportunities for job seekers will shrink. Banking is no exception to this fact.

5.2.2. Voice Revolution will takeover online banking
As voice recognition and voice authentication mature, web traffic to banking sites and mobile applications may drop by 50% in next few years. Customers will simply TALK to an internet connected device and perform most common banking tasks within few seconds. Drop in web traffic due to voice recognition systems could pose a serious threat to banking industry. The customers who currently visit the websites for banking tasks, also go through the marketing promotions on the site. The banks may lose the opportunity to cross sell current customers with drop in web traffic.

5.2.3. Issues related to Biometrics
Operational issues – A minor could change the voice quality and may pose problems in speech authentication. People who work in labour intensive jobs may have damaged fingerprints. Even the senior citizens may have problem in fingerprint authentication.

5.2.4. Security issues
In its note on 'Digital Payments - Analysing the cyber landscape', KPMG mentioned, cybersecurity is one of the most critical challenges faced by stakeholders of the digital payment ecosystem. With more and more users preferring digital payments, the chances of getting exposed to cybersecurity risks like online fraud, information theft, and malware or virus attacks are also increasing. Lack of awareness and poor digital payment ecosystem are some of the primary reasons that have led to increase in these attacks.

5.2.5. Digital literacy in rural areas
There has been considerable growth in the users of smartphone in rural India in last few years. But not many are aware and confident about online banking through smartphones. The primary usage of smartphone is restricted to entertainment and communication only. As the urban tech savvy customers adopt the changing landscape of ICT innovation in banking, Indian rural population yet needs to be educated about the concepts of AI, Biometrics, Blockchain, Big Data etc.

5.3. ALTERNATIVE SOLUTIONS
Following steps can be adopted by the banks to overcome the challenges
5.3.1. Transition to AI
Top management and Leadership of the banks should play a significant role. Effective communication regarding the need and implementation of AI in the organisation to all the employees may help achieve smooth transition. All employees irrespective of their age, will have to equip themselves with latest technology innovation in the industry and upgrade their skills.

5.3.2. Voice Revolution
As voice revolution takes over, traditional online banking traffic is bound to get displaced. Banking industry should evolve its web presence by offering higher end products such as loans, mortgages and financial planning tools. Websites should soon evolve to focus on superior experiences for financial education, planning and simplifying complex financial decisions.

5.3.3. Biometrics
Multifactor authentication with biometrics being prominently used could help minimise frauds.
Behavioural biometrics could provide additional protection to enhance banking security in the future.

5.3.4. Security
As mentioned rightly in KPMG report, Cyber Security should be shared responsibility of government, organizations as well as the end users. Users should be aware of the basic security features. Organisations should regularly update their software and fraud detection systems. The government should focus more on educating the customers and should enforce basic security standards for organizations. All the breaches should be mandatorily reported.

5.3.5. Digital Literacy
The government of India has launched National Digital Literacy Mission with the vision to empower at least one person per household with crucial digital literacy skills by 2020. It targets to train 60 million rural Indians. This mission will help in educating the rural population to understand the importance, ease and benefits of digital transactions. This will boost competitiveness of Indian banking sector in years to come.

VI. Conclusion

6.1. Following figures highlight the significance of digital banking in India, thereby necessitating the banks to adopt innovative strategies in ICT to sail through the wave of technology.

Source: www.statistia.com

Total Transaction Value in the "Digital Payments" segment in India amounts to US$43,831m in 2017

Total Transaction Value is expected to show an annual growth rate (CAGR 2017-2021) of 19.5% resulting in the total amount of US$89,260 m in 2021

6.2. The innovations in Indian banking sector highlighted in the study indicate that the banks are ready and equipped to take a leap and offer modern banking services. The current trends in banking are building blocks of the 'Cashless Economy'. Though there are few challenges, technology will keep evolving and with collaborative efforts of Banks, Government and end users, overcoming these challenges will certainly be possible. The initiative of Government of India will very soon achieve its mission and rural India too would be 'digitally literate'. Banks will have to develop a strategy to bridge the gap of technology in rural banks and urban banks.

Today, Indian banking industry is on the threshold of 'next generation banking'. ICT innovation clubbed with dream of 'cashless economy' will certainly bring about metamorphosis in the banking sector.

6.3. Scope for future study : An empirical comparative study of public sector and private sector banks will lead to in depth analysis of readiness of the banks and its employees with respect to the trends and challenges of ICT revolution.

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