

Trends, Opportunities, and Challenges of Digital Banking in India: A Review

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Abstract

The predominant channel for providing banking services in the country in the recent years has been Digital Banking. The digital banking has unlocked the door to a variety of banking services by empowering customers to do the daily financial transactions at their convenience. In India, the digital banking in India is growing at a faster rate as a result of the extensive use of mobile phones and the internet. Among other issues, understanding the behaviour, preferences, choices, needs and goals of the digital customer is the first step in any successful digital transformation.

The past few decades, the banking industry has seen three major clear-cut phases of digital change. With an emphasis on increasing customer convenience, the first change was the development of Automated Teller Machines (ATMs), call centres, and telephone banking, and the banking became transactional and technology centric. The next phase introduced personalised banking services and was influenced by a variety of SMAC (Social, Mobile, Analytics and Cloud) technologies. The third stage was driven by more recent technologies, like Artificial Intelligence (AI), Robotic Process, Automation, Blockchain, Application Programming Interface (API) Banking, and Internet of Things (IoT), to offer far deeper degrees of personalisation and improved user experience. These transformations lead to a substantial shift from a product centric to a customer centric perspective. Under this background, this paper examines the digital banking in India, present status, trends, opportunities, and challenges of digital banking in India using secondary data and literature review.

Keywords: Digital Banking Units, Digital transformation, Payment Systems

Introduction

The COVID-19 pandemic has brought to light the crucial part that digital infrastructure may play in enabling banks and other financial institutions to provide services quickly. The magnitude of the changes was demonstrated by the fact that 71 per cent people in developing countries now have a bank account, up from 42 per cent a decade ago (Doran, N.M., et

al, 2022). In the last few years, the banking landscape has seen a noticeable transformation on account of digital banking or digitization of banks. The digital technologies restricted to customer-facing banking channels only at the beginning, at present, cover the entire spectrum of banking. Therefore, digital banking through cutting-edge technologies is the solution for all participants, whether it be back-end operations or customer facing channels, in the financial service sector. The country is witnessing a digital age success at an unbelievably high rate. It opens a wealth of opportunities in the banking sector. The changeover to digital banking from traditional banking has brought about enormous changes in the lifestyle of the people in India. These innovative technologies along with the recent changes in banking and finance field in India are expected to reshape the banking and financial sectors. This study is done with the objectives: 1) to understand various channels of digital banking and to examine the trends in digital banking services in India 2) to study the opportunities and the challenges of digital banking in the country.

Review of Literature and Theoretical Framework

The process of converting data into digital format is known as digitalization. Technology adoption is what is meant by digitization. It was found that the digital assistant and the remote expert are the two important technology-based models organisations are implementing to assist customer's immediate needs in a competitive digital space (Parise et al., 2016). The adoption of many current and emerging technologies by banks can be seen as a component of digital banking (Rajeshwari M. Shettar, 2019). Digitalization is the application of technology to develop current business processes or introduce new methods, which enhances the customer experience and results in better currency exchange rates for the company. Technology, software, data, and organizational reorganization are the four main components of digital transformation (Amudhan, S.et al., 2022). The role of digitization in Indian banking, the trends and factors that affect the scope of the country's digital banking were studied by Mrinali Kankar & Vishal Gauttam (2015). The banking operations in future are highly adaptable. According to Deloitte, the growth and development of digital banking is engaging customers at the centre of every digital strategy, which institutions must implement now in order to integrate successfully by 2030 (Karjaluo, H., 2002 as cited in Amudhan, S.et al., 2022).

For banking sector in India, which is focused to give enhanced customers services, digitization has become essential. Internet banking is one of the most important banking channels. E-banking, sometimes referred as online banking, virtual banking, or internet banking. It is a system that enables customers to conduct their banking transactions such as funds trans-

fers, repayment of loans/EMIs, deposit and cash withdrawals electronically through the use of internet (Ani Smriti & Rajesh Kumar, 2021). In other words, offering a variety of banking services over an electronic and telecommunications network is known as Electronic Banking (Anandha Jothi Jeyalakhsmi, K., 2019). Online banking or internet banking are other names for digital banking and it is becoming the predominant channel for providing banking services in the country in the recent years. Under this background, this paper examines the present status, trends, opportunities, and challenges of the digital banking.

Methodology

The study is descriptive in nature. The data used for the study is secondary data and it has been collected from RBI website, RBI publications and research articles/papers. The data for analysing trends were collected from the latest RBI report i.e., Report on trend and progress of banking in India 2021-22. Since Google Scholar is a freely available web search engine, it was used to search for the scholarly articles/papers for 11 years (2012-2022). The key words such as digital banking: trends, opportunities, and challenges were used for search for identifying the papers. After preliminary scrutiny, 60 articles/research papers/thesis selected and reviewed for the purpose of this study. For the purpose identifying the major opportunities and challenges for digital banking in India, 52 relevant papers were reviewed and listed in table 3 & 4 respectively.

Results and Discussion

Digital banking Channels and its trends in India

Before to the 1990s, branch banking was prevalent. The ICICI Bank was the first entity to receive credit for introducing internet banking in India in 1996. Citibank and HDFC Bank have launched their own internet banking services in 1999. The IT Act was passed by the Government and it became effective from October 17, 2000. It gave e-commerce and other forms of electronic business legal legitimacy. RBI continuously monitors and reviews the legal and other requirements of e-banking. The main digital financial services offered by banks include mobile banking, online banking, ATMs, NEFT, PPIs, SMS Banking, e-cheques, debit, and credit cards etc. (Monika Kataria, 2019). Automated Teller Machines (ATMs), Internet Banking, Mobile Banking, Phone Banking, Tele banking, Electronic Clearing Services, Electronic Clearing Cards, Smart Cards, Door Step Banking, and Electronic Fund Transfer are all e-banking products and services provided by Banks in India to their customers. Ani Smriti & Rajesh Kumar (2021), with the advent of smartphones and tablets, the banking industry has grown to cover transactions conducted outside the bank branches.

This stage of banking is called as “Digital Banking” (Paritosh Sharma & Ankit Kumar, 2020).

During the past few decades, the banking sector has undergone several distinct phases of digital change. The first change was a shift from manual operations to computerised operations, which increased efficiency and paved the way for an automation-driven paradigm that made banking more transactional and technologically focused. Banks began concentrating customer convenience with cutting edge-technologies. The Government has been showing great support with schemes like “Pradhan Mantri Jan Dhan Yojana” and “Digital India.” These schemes seek to give every citizen a bank account and turn India into a digitally empowered nation (Harshil Sharma & Shipra Aggarwal, 2023). In order to stay competitive, regulators, banks and financial institutions have under compulsion to introduce cutting-edge technologies. The next wave was driven by a variety of SMAC (Social, Mobile, Analytics and Cloud) technologies that are now having a visible impact on the banking services and products of today propelled the next wave. Through the use of these technologies, banks and financial institutions were able to transform from efficient enablers to more specialized providers of banking services. The current phase of digital transformation propelled by new technologies like Artificial Intelligence, Robotic Process Automation, Block chain, API Banking, and Internet of Things which have the potential to significantly change the banking sector. When these technologies are used properly, banks and financial institutions will be able to provide considerably advanced degrees of personalization and enhanced experience to customers, transform operations of banking, and primarily alter the banking business of today.

The evolution of digital banking through its various phases has had significant implications for the banking and financial sector, customers, and society. The consequences of each stage are as follows: First Stage (Telephone and ATM Banking, Transactional and Technology-Centric Banking):

- 1) Convenience: Customers may now obtain basic banking services like withdrawals, deposits, and balance inquiries more easily without having to visit a physical branch thanks to the introduction of ATMs and telephone banking.
- 2) Cost Reduction: Since automated phone systems and ATMs eliminated the need for human tellers, banks experienced a decrease in operating expenses.
- 3) 24/7 Access: Clients now have round-the-clock access to their accounts and basic transactions, giving them more financial management flexibility.

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- 4) **Reduced queues:** The introduction of ATMs eliminated the need for customers to stand in lengthy lines at physical bank locations. Digital banking channels lessen their negative effects on the environment, boost company resilience, and require less operating space, all of which can further cut expenses and carbon emissions. customer-friendly transactions (Yip, A.W.& Bocken, N.M., 2018). Second stage (Personalized Banking):
 - 1) **Customer-Centric Approach:** Banks began emphasising individualised services, tailoring products/services, and experiences to meet the needs of specific customers.
 - 2) **Improved Customer Experience:** Higher customer satisfaction was attained as a result of personalised recommendations, online banking, and mobile apps.
 - 3) **Data Utilisation:** In order to better understand customer behaviour and preferences, banks started collecting and analysing customer data. This enabled for more focused product offerings and marketing.
 - 4) **Competition:** The rise of fintech firms and neo banks has increased competition in the financial sector, challenged the established banks to innovate and adapt. Third stage (AI, Internet of Things, Robotics, and other emerging technologies):
 - 1) **Enhanced Automation:** Banks can automate more procedures thanks to artificial intelligence, robots, and the Internet of Things (IoT), which lowers operating costs and boosts productivity.
 - 2) **Predictive Analytics:** Banks are now able to make data-driven choices on risk management, fraud detection, and credit rating thanks to artificial intelligence and big data analytics.
 - 3) **Customer Insights:** Banks are able to offer more personalised services and product recommendations by gaining a deeper understanding of customer behaviour and demands.
 - 4) **Risk Management:** AI can assist banks in more accurately identifying and controlling risks, such as cybersecurity threats and credit risk.
 - 5) **Financial Inclusion:** By permitting access through mobile devices and innovative channels, these technologies can expand financial services to underserved populations. In order to address the issues of infrastructure and travel expenses, digital banking is a viable option for banks in less developed nations to provide banking services to the underprivileged (Yip, A.W.& Bocken, N.M., 2018).
 - 6) **Challenges in Cybersecurity:** Strong cybersecurity measures are needed to safeguard customer data and financial systems as a result

of the growing risks of cyberattacks and data breaches brought on by technological advancements.

With the help of Automated Teller Machines (ATM's) bank customer can perform their banking transactions particularly cash withdrawal without the aid of a cashier or clerk. ATMs may also print passbooks, deposits cheques, generate PINs, check balances, and conduct other tasks. The number of ATMs as at the end of March 2021 and 2022 is presented in table 1. The number of ATMs in India increased by 10640 during the year 2021-22. Out of total ATMs, 12.64 per cent are White Label ATMs.

Table 1: Position of ATMs (as at 31st March)

(Figures in numbers)

Sr. No.	ATMs	2021	2022
1	On-Site ATMs	115605	119748
2	a) Off-Site ATMs - All SCBs	97970	97981
	b) Off-Site ATMs-WLAs	25013	31499
4	Total	238588	249228

Source: RBI

The launch of United Payments Interface (UPI) in April 2016 and Bharat Interface for Money (BHIM) in December 2016 by National Payments corporations of India (NPCI) are important innovations in the field of payment systems and are subject to RBI regulation. UPI is the one of the swift and most secured payment gateways. It has completely transformed the process of payments. With the usage of mobile phones, it is possible to do interbank transactions including funds transfers at anytime and anywhere.

The users of Bharat Bill Payment System (BBPS) derive the advantages such as standardised and uniform experience in bill payment, centralised grievance redressal mechanism for customers and fixed and predetermined customer convenience fee. In order to assist the feature phone users to make UPI payment, UPI 123Pay was introduced in March 2022. The UPI Lite was launched in September 2022 to facilitate low value offline transactions through an on-device wallet. The BBPS ecosystem has expanded from 168 billers and 1.10 crores transactions valued Rs.1900 crores in September 2019 to 20,519 billers and 9.49 crores transactions valued Rs.16,585

crores in November 2022¹.

The latest improvements in digital banking systems with numerous features such as IMPS (Immediate Payment Service), RTGS (Real Time Gross Settlement), NEFT (National Electronic Funds Transfer), Online Banking, and Tele-banking, it has become easier, simpler, paperless, signature-less, and branch-less to undertake banking transactions. The growth of various modes of digital payments RTGS, credit Transfers (including IMPS, UPI, NEFT) debit transfers (including NACH and card payments (both Credit and debit cards)) were presented in table 2.

The paper instruments like cheques and demand drafts were currently replaced by digital payment modes. The digital mode of payments has grown with quantum jump during the last few years. The digital mode constitutes 99 per cent of total payments. While the total payments grew by 63.8 per cent and 23.1 per cent in terms of volume and value respectively, the digital payments grew by 64 per cent and 26 per cent in terms of volume and value respectively during the year 2021-22.

Table 2: Indicators of Payment Systems

Indicators	Volume (Lakhs)			Value (Rs. Crores)		
	2019-20	2020-21	2021-22	2019-20	2020-21	2021-22
1.Large Value Credit Transfers-RTGS	1507	1592	2078	13,11,56,475	10,55,99,849	12,86,57,516
2.Credit Transfers	2,06,297	3,17,868	5,77,935	2,85,56,593	3,35,04,226	4,27,28,006
2.1. AePS (Fund Transfers)	10	11	10	469	623	575
2.2. APBS	16,747	14,373	12,573	99,048	1,11,001	1,33,345
2.3.ECS Cr	18.3	0	0	5,146	0	0

1 RBI (2022) Report on trend and progress of banking in India 2021-22

2.4. IMPS	25,792	32,782	46,625	23,37,541	29,41,500	41,71,037
2.5. NACH	11,100	16,465	18,758	10,37,079	12,16,535	12,81,685
2.6. NEFT	27,445	30,928	40,407	2,29,45,580	2,51,30,910	2,87,25,463
2.7.UPI	1,25,186	2,23,307	4,59,561	21,31,730	41,03,658	84,15,900
3. Debit Transfers & direct debits						
	6,027	10,457	12,189	6,05,939	8,65,520	10,34,444
3.1. BHIM & Aadhaar Pay						
	91	161	228	1,303	2,580	6,113
3.2.ECS Dr	1.14	0	0	38,607	0	0
3.3. NACH	5,842	9,646	10,755	6,04,397	8,62,027	10,26,641
3.4. NETC	93	650	1,207	200	913	1,689
4. Card Payments						
	72,384	57,787	61,783	14,34,813	12,91,799	17,01,851
4.1. Credit Cards						
	21,773	17,641	22,399	7,30,894	6,30,414	9,71,638
4.2. Debit Cards						
	50,611	40,146	39,384	7,07,920	6,61,385	2,30,213
5.PPIs	53,941	49,366	65,783	2,14,860	1,97,095	2,79,416
6.Paper based Instruments						
	10,414	6,704	6,999	78,24,822	56,27,108	66,50,333
Total Digital Payments						
	3,40,155	4,37,068	7,19,768	16,19,68,681	14,14,58,488	17,44,01,233
Total Retail Payments						
	3,49,063	4,42,180	7,24,689	3,86,37,028	4,14,85,747	5,23,94,049
Total Payments						
	3,50,570	4,43,772	7,26,767	16,97,93,503	14,70,85,596	18,10,51,565

Source: RBI (2022) Report on trend and progress of banking in India 2021-22

Now, bank customers can make purchases using credit/debit cards instead of carrying actual cash. In order to facilitate a card-less cash withdrawal facility across all banks as well as ATM networks in an interoperable way, the RBI allowed customer authorisation using UPI with settlement of transactions through the ATM network in May 2022.

One of the key developments in the digital banking is mobile banking using a smartphone. It helps to carry out several banking services such as checking of balance in bank accounts, money/funds transfer, and bill payments, without the need of visiting the branch. In digital banking, the acquisition of IoT (Internet of Things) and Voice-Enabled Payment Services are to develop as future realities.

In Phone Banking, the customer can actually do entire non-cash related banking on telephone. It uses Automatic voice recorder (AVR) for simple queries and transactions as well as manned phone terminals for complicated queries and transactions. Internet banking enables customers to carry out banking transactions through the bank's website on the internet.

Prepaid Payment Instruments (PPIs) are payment instruments including Mobile Wallets and PPI Cards. These instruments enable customers to purchase of goods and services, including financial services, remittance facilities etc. against the value stored in such instruments. Financial Technology (Fintech) companies (examples include Paytm, PhonePe and MobiKwik etc.) are the ones that extend technology services to the banking sector and have become an integral part of the banking services sector in the country.

Banks use artificial intelligence in areas such as Chatbots, Customer Support and Helpdesk, Digitization and automation in back-office processing, wealth management for masses, risk management, Security, ATMs, and Robots. In digital banking QR codes are used as the bridge for fast transactions and reduce lengthy process of providing bank details. One can instantly send money by just scanning the QR code of the beneficiary using the camera of the Smart phone, this is made possible by AI powered processors of smart phones and latest operating systems (Ramkanna R.,2019). Blockchain employs technology to produce blocks to process, verify and record transactions. NITI Aayog is developing India's largest Blockchain network named India Chain. It is expected to transform several industries, reduce the chances of fraud, enhance transparency, hasten the transaction process, use minimum human intervention, and develop an unshakable database. Biometric Authentication system has transformed the national identity policies and the impact is expected to be widespread. With a combination of encryption technology and OTPs, biometric authentication is projected to develop a highly-secured database to protect account information from leaks and hacker's attempts.

The application of cloud technology in banking helps improved data security, enhanced flexibility and scalability, increased efficiency, quicker services, solution, easier integration of latest technologies and applications. With the advent of smartwatch technology, the banks hope to create wearables for customers of retail banking. With the help of wearables bank can offer its customers to access their accounts with more control and easy access. The use of social media is new trend in banking. At present, banking on social media is restricted to product marketing, customer engagement, and assistance. Few banks have already started to permit their customers to transact online and open new account using Facebook.

In order to build paperless and branchless banking, new breeds of banks called 'digital-only banks' have evolved. ICICI Pockets is the first digital only bank in the country. In October 2022, 75 Digital Banking Units have been set up in 75 districts in memory of 75th anniversary of our independence.

Opportunities and Challenges for digital banking in India

The major opportunities for digital banking in India are presented in table 3. From the table it is clear that there are number of opportunities for digital banking such as increasing number internet and mobile users, government initiatives, entry of fin-tech companies and online platforms, various advantages of digital banking for both customers as well as banks. Digital banking by handling data will play an important role by delivering competitive advantage (Rajaneesh C et al.,2019). The increasing number internet users in India created opportunities for digital banking industry (Bharati Yelikar, 2019; Dhanya C & K. Ramya,2019; Satav, G. P. & Waghmare, S. N., 2019; Shahabas Ahmed, C.B & Sreeju, V. V., 2020; Shiva Johri & Meeta Sharma Moghe, 2020; Varsha Agarwal et al., 2020; Ani Smriti & Rajesh Kumar, 2021; Harshil Sharma & Shipra Aggarwal,2023). The government has asked all departments to enable electronic payment options such as Bhim-UPI QR code at their cash counters as part of plans to boost digital transactions. Nearly all government payments, including taxes, tariffs, and even fines are now being collected digitally (Chitra, I., 2019; Shahabas Ahmed, C.B & Sreeju, V. V., 2020; Harshil Sharma & Shipra Aggarwal,2023). Government and RBI are encouraging the emergence of innovative digital banking solutions like fin-tech start-ups (Aarti Sharma & Nidhi Piplani, 2017; Revathi, P.,2019). Ashwini Sanmath (2018) emphasised Fintech's role in digital banking. People can conduct business with e-commerce without being constrained by time or distance (Shahabas Ahmed, C.B & Sreeju, V. V., 2020). One can log on to the internet at any time be it day or night and purchase or sell anything they want. To bring the entire country into the Digital Era, the Government of India wants to

digitize banking in rural areas. It may be possible to reduce cash-based crimes in rural areas. Rural areas benefit from more financial independence and more financial freedom (Satav, G. P. & Waghmare, S. N.,2019; Shahabas Ahmed, C.B & Sreeju, V. V.,2020).

Table 3: Major Opportunities for Digital Banking in India identified through literature review

Name of study	Opportunities/benefits identified
Harshil Sharma & Shipra Aggarwal (2023)	Digital Banking Solutions, initiatives of Government, Usage of Smart phones, Internet Penetration
Amudhan S.et al,2022	Trustworthiness, getting new clients is less expensive and easier, Personalized Offering, Facilitates Innovation and Adaptability
Pinki & Aryan (2022)	Saves time, 24 hours service, less black money, cashless economy
Ani Smriti & Rajesh Kumar (2021)	Unexploited Rural Markets, Numerous Channels, Competitive Advantage, Growing Internet Users & Computer Literacy, Valued Customer Service, Internet Banking, Retail Lending
Shahabas Ahmed, C.B & Sreeju, V. V (2020)	Internet Penetration, Usage of Smart phone, Initiatives of Government, Digital Banking Solutions, E-Commerce, Untapped Rural Market
Shiva Johri & Meeta Sharma Moghe (2020)	Increasing internet users, Computer literacy, Competitive Advantage
Revathi, P. (2019)	DISC (Digital Native, Intelligent, Social, Connected) Customers, Leveraging the power of Social, Penetration of mobile, Promotion of digital economy by Govt.& regulator, FinTech boom
Monika Kataria (2019)	Convenience, Flexibility, Time Saving, digital banking record of transactions, Lower Overheads, Online Bills Payments, Environment Friendly, Offers Availability
Bharati Yelikar (2019)	Unexploited Rural Markets, Numerous Channels, Competitive Advantage, growing Internet Users & Computer Literacy, Valued Customer Service, Internet Banking, Retail Lending
Mukesh Kumar & Jaspal Singh (2019)	more profits, more customers, Mobile banking, fastened services, Better market predictions
Anitha Begum, A. (2019)	reduce costs, increase revenue, address competition
Chitra, I (2019)	digital infrastructure, Government initiatives Digital Empowerment, decreased documentation, easy to do

Chandrasekaran, S. & Narayanan, M. (2019)	Enhanced efficiency, operations control, productivity, and profitability
Himanshu Arya (2019)	Convenience, low-cost higher interest, transfer services, Ease of monitoring, Ease of transaction, Discounts, quality services, any time cash facility
Kamna Billus & Nidhi Sharma (2019)	DISC customers, leveraging power of social, right time & right place,
Satav, G. P. & Waghmare, S. N. (2019)	Unexploited Rural Markets, Numerous Channels, Competitive Advantage, Growing Internet Users & Computer Literacy, Valued Customer Service, Internet Banking, Retail Lending
Usha, S (2019)	convenience to customers, Low operating cost, convenience to customers, Customers get discount from retailers
Subha, M & Sheeba, E. (2019)	Reaching more client, effective and efficient transactions, Convenience, Lower transaction cost, easy to use, Expenses control for customers, effective security, and anti-fraud tools
Nithya, V. (2019)	24/7 Account and Service Access, Speed and Efficiency, Online Bill Payment, Low Overhead and Low Fees, Low Overhead and Yield High Rates
Santhosh Kumar, S. (2019)	disruptions Fin-Tech platforms, regulatory compliance become easy
Abhinav Sharma (2014)	consistent and accurate data, MIS, effective control and monitoring, uniformity in implementation, easy reconciliation, Ease of system administration
Aarti Sharma & Nidhi Piplani (2017)	Increased internet user, Government initiatives (AEPS, Aadhaar Cards), Digital innovations (Bitcoins and Block Chain), Entry of Online platforms
Sujith, T. S. & Julie, C. D. (2017)	Easy and convenient, Discounts from taxes, Written record, Less Risk
Shubhara Jindal (2016)	Very low setup cost, large number of customers, savings in operational costs, Personalized services to the customers of bank, Decline in branch banking. Anytime banking transactions to customers
Jamaluddin, N. (2013)	IT Networking System Integration and Management. Customer Relationship Management (CRM) Applications, Back Office processing and Call Centres. Data warehousing/ Data mining
Chaimaa, B. et al. (2021)	Convenience, Ease to use, Low cost, Time factor, Fast delivery, On-line bill payment

Dhanya C & K. Ramya (2019)	Growing mobile and wireless market, increasing use of mobile and smart phone devices
Devika V. (2019)	Lower manpower and back-office cost, Time saving, Convenience, 24 x7 service on all days
Hyde, A.N. (2015)	Reduced time in transactions, Less crowd in branches
Luigi Wewege et al. (2020)	Providing customer-centric, faster-easier-convenient-free, financial services.
Lyubov Anatolyevna Petrova et al. (2020)	Automation of routine bank operations- fewer employees and decreased operating costs, Reduction in the cost of affiliate customer service
Mari Anand N. (2015)	Lower costs of banking service, 24 hrs. accessibility, reduced costs in Accessing, proper cash management, reduced, time demands, increased comfort as well as quick and continuous access to the information
Niranjani D (2019)	Reliable and Cashless payment system, cost reduction, Greater reach, Customer loyalty, Quick service, time saving, easy access to information, 24 hrs. access, reduce paper, work, no need to carry cash
Patnaik, B. C. M. et al. (2017)	Quick customer adoption of digital technologies
Saranya K. & S. Fatima Rosaline Mary (2019)	Easy and fast Customer services
Vengateshan P. & Venkatesan, T. (2019)	Increased customer services, reduces cost, better productivity, and a variety of banking operations
Varsha Agarwal et al. (2020): mobile banking	Increasing penetration in the smartphone and internet users, Ease of accessibility, Convenience & security
Mrinali Kankar & Vishal Gauttam (2015).	Customer Service, Availability 24x7, Time saving, Lower overheads, more services

The major challenges for digital banking in India are presented in table 4. These broadly classified into traditional and modern challenges (Harshil Sharma & Shipra Aggarwal, 2023). The important challenges revealed from the table are lack of digital literacy/customer awareness, preference for cash transactions, unfamiliarity of doing transactions in bank's website (internet banking), regulatory compliance, security risk and privacy etc.

Table 4: Major Challenges for Digital Banking in India identified through literature review

Name of Study	Challenges identified
Harshil Sharma & Shipra Aggarwal (2023)	<p><i>Traditional Challenges:</i> Lack of Digital Literacy, Slow Digital Transformation, Cash Dependent Economy, Improper Customer Engagement, Strict Regulatory Standards, Customer's Preference for Traditional Branches</p> <p><i>Upcoming Modern Challenges:</i> Integrating Artificial Intelligence, Payment Processing Costs, Competition between Banks and Fintech Companies, Increasing Competitions, Adoption of New Technology</p>
Amudhan, S.et al (2022)	Digital illiteracy, Vulnerable system, and mistrust, Selective to non-acceptance of digital payments, Limited number of transactions, Inadequate infrastructure, informal or unstructured, cash rural economy, impoverished rural population
Pinki & Aryan (2022)	Fear of unemployment, Illiterate people not understanding, Fraud
Ani Smriti & Rajesh Kumar (2021)	Risk in Security of banking. The Trust Factor, Lack of or inadequate awareness of customer, Privacy risk, Non-availability of Personnel services, Difficulties in Implementation of global technology, Non-Performing Asset, Stiff Competition, Difficulties in Handling Technology
Adithya, P.J. & Jyothika, K.J. (2021)	Increasing Competitions, Cultural shift, Regulatory Compliance, Changing Business Models, Rising Expectations, Customer Retentions, Outdated mobile experiences, Security Breaches, Continuous Innovation
Paritosh Sharma & Ankit Kumar (2020)	Internet Penetration, Internet Shutdowns, Inadequate Infrastructure, Financial Literacy, Cyber Crime and Security
Shahabas Ahmed. C.B. & Sreeju. V. V. (2020)	Lack of Digital Literacy, Cash Dependent Economy, Privacy risk, Security Risk, Stiff Competition, Low Internet Penetration, Managing Technology, Difficult for First Timers, Cyber Crime, Regulation and Legalities, Sustainability
Shiva Johri & Meeta Sharma Moghe (2020)	Fear of online threat, Difficult for first-timers, Preference for Traditional system
Puneet Kaur (2020)	Security Risks, Financial Literacy/Customer Awareness, Fear factor, Training

Revathi, P. (2019)	Traditional banking habits, Security risks, Transaction Difficulties, Technical glitches, low marketing Budgets, Sustainable competitive advantage, Inconvenient and the death of loyalty, Difficulties in Understanding customer context, issues in impact of automation on workforce
Monika Kataria (2019)	Security, Difficult for First Time Users, Customer's Preference for Traditional Branches, Low Broadband Internet Penetration, Impersonal, Regulation and Legalities, Fear of Online Threats, A Limited Scope of Services, Unnecessary Mails and Notification
Mukesh Kumar & Jaspal Singh (2019)	Security, Trust, threat from non-financial institution, Internal barriers
Sathish, J. (2019)	Bad loans, Asset quality, Balance sheet management, Bank fraud, Capital adequacy, Cyber threat, Employee and technology, Unhedged forex exposure
Bharati Yelikar (2019)	Risk in security of banking, the Trust Factor, Lack of or inadequate awareness of customer, Privacy risk, Non-availability of Personnel services, Difficulties in Implementation of global technology, Non-Performing Asset, Stiff Competition, Difficulties in Handling Technology
Chitra, I. (2019)	Vulnerability to hacks, rural people, lack of awareness
Anitha Begum, A. (2019)	Difficult to automate
Kavitha, D. (2019)	cybercrimes related to electronic/ internet/ digital banking.
Dhakshanamoorthy, K. (2019)	Customers' non-awareness, security, reluctance to change long-time habit of manual banking,
Chandrasekaran, S. & Narayanan, M. (2019)	Habit to usage of cash, Complexity of using Internet, Fraud and hidden charges, Absence of human interaction, low penetration of Smartphones particularly in rural area, poor or low internet speed as a result connectivity problems, Fear of privacy and security
Himanshu Arya (2019)	not safe and secure all the time, lack of preparedness, less profit
Kamna Billus & Nidhi Sharma (2019)	Sustainable Competitive Advantage, inconvenient & dearth of loyalty, difficulty in understanding customer context, need for continuous automation & future work
Srihari Subudhi (2019)	Availability of correct data, many languages, data privacy ,skilled ,manpower, fear of unemployment, unwillingness of employees

Satav, G. P. & Waghmare, S. N. (2019 internet banking)	Security Risk, Trust Factor, Customer Awareness, Privacy risk, Strengthening the public support, Availability of Personnel services, Implementation of global technology, NPA, Competition, Handling Technology
Kayal vizhi, T. (2019)	Automation and AI may lead to unemployment, Voice Revolution will take over online banking, Issues related to Biometrics, Security issues, Digital literacy in rural areas
Subha, M & Sheeba, E. (2019)	Fraud, lack of anonymity, need for internet access
Nithya, V. (2019)	Technology Problems, Issues in Security, inefficiency in Complex Transactions, No Relationship or contact with Personal Banker
Santhosh Kumar, S. (2019)	Attaining app perfection, Technology Upgrades, Cyber Crime, Spearheading with Innovation, Sustainability, Delivering Quality at Speed
Ghana Shyam Kafley & M. Chandrasekaran (2018)	Lack of Trust, Web services too complex, Lack of Awareness, Unbanked People
Sujith, T. S. & Julie, C. D. (2017)	Difficult for a non-technical person, risk of data theft, Overspending, Intermediaries in the payment process
Aarti Sharma & Nidhi Piplani (2017)	Prerequisites of internet connection and a smart device, digital literacy, Security of user's information, Difficulty in understanding the usage
Shubhara Jindal (2016)	Not safe and secure, High start-up cost, Lack of Professional, Restricted Business, Improper infrastructure, not techno savvy, Unavailability of internet services, Competition
Shilpi Khandelwal (2012)	Security
Abhinav Sharma (2014)	Security, Authentication, Digital Signature, Digital Certificate: Standardization, Heavy Investment Cost, Infrastructure, Legislative and Regulative Issues, Social Challenges, Privacy
Chaimaa, B. et al. (2021)	Accessibility concerns, Difficulty to use, High start-up cost, Authentication process time, Availability concerns, Security concerns
Dhanya C & K. Ramya (2019)	keep up customer alliances and the new technologies, and competitive strategies, safety, and security
Hyde, A.N. (2015)	Building customer trust-safety of e-banking, People need to be tech savvy to use the services

Mari Anand N. (2015)	Security, privacy, and risk
Mustafa Hassan Mohammad Adam (2013)	Barriers to ICT, Standardization, Illiteracy
Patnaik, B. C. M.et al.(2017)	Frauds and customer complaints
Vishal Goyal et al. (2012): Mobile banking	Security / Privacy, handset operability, Standardization, application software, Customization, telecom service quality
Srinivasa Rao, R. (2013): mobile banking	Initial interoperability, mobile phone devices & supporting software, standardisation, regulatory compliance, Ensuring service 24 x 7, multiple languages
Rajeshwari M. Shettar (2019)	Technical defaults, awareness, Customization, requirement good website, cyber threats, regulatory constrains

One significant issue with digital banking is a lack of digital literacy (Aarti Sharma & Nidhi Piplani, 2017; Shahabas Ahmed. C.B. & Sreeju. V. V., 2020; Ani Smriti & Rajesh Kumar, 2021; Amudhan, S. et al., 2022; Pinki & Aryan, 2022; Harshil Sharma & Shipra Aggarwal, 2023). Due to lack of inadequate knowledge and fear of committing mistakes, people who are digitally illiterate are afraid of undertaking digital transactions. Even a small mistake might result in significant financial loss. As the majority of Indians are more comfortable and secure in handling cash, they rely on cash transactions. Due to the lack of or inadequate knowledge about the latest technology and illiteracy, the rural people in India may not have clear understanding of undertaking digital financial transactions (Kayal vizhi, T., 2019). It could be challenging for a new user to use internet banking through bank's website. Other difficulties with digital banking include security and privacy risks (Vishal Goyal et al., 2012; Shilpi Khandelwal, 2012; Abhinav Sharma, 2014; Mari Anand N., 2015; Bharati Yelikar, 2019; Monika Kataria, 2019; Mukesh Kumar & Jaspal Singh, 2019; Chandrasekaran, S. & Narayanan, M., 2019; Satav, G. P. & Waghmare, S. N., 2019; Puneet Kaur, 2020; Ani Smriti & Rajesh Kumar, 2021; Chaimaa, B. et al., 2021). One of the main obstacles stopping customers from selecting digital banking services is the risk of revealing private information and fear of identity theft (Sujith, T. S. & Julie, C. D., 2017). Most of the customers think that using online banking services is more vulnerable to identity theft. Another issue in the area of digital banking is cybercrime and security. Most of banking applications are vulnerable to cybercrime or cyberattacks. There exists the possibility of not only losing money but also compromising customer's data.

Competition in the banking sector presents the banks with several challenges. It includes product positioning, innovative ideas and channels, latest market trends, cross selling and handling assets and managing risks at managerial and organizational level. The non-availability of internet in rural areas is one of the major challenges faced by digital banking (Shubhara Jindal, 2016; Chandrasekaran, S. & Narayanan, M.,2019; Subha, M & Sheeba, E.,2019; Shahabas Ahmed. C.B. & Sreeju. V. V.,2020). Managing technology, a key challenge for the Indian banking sector. In order to reach and maintain the best service and efficiency standards it is imperative to improve or acquire the right technology, deploy it properly and then leverage it to the maximum extent possible while maintaining cost effectiveness and delivering sustainable returns to shareholders,

Conclusions and Policy Implications

The paper discussed various channels of digital banking services in India its India including three phases of digital change and its implications for the banking and financial sector, customers, and society along with the growth in ATMs & various payment systems indicators. The study revealed that there is remarkable progress in digital banking in India. The face of banking in India has been greatly transformed with the use of numerous technologies like UPI, internet banking, mobile banking, mobile wallet, QR Code etc. Overall, the progression of digital banking has led to increased convenience, personalization, efficiency, transparency and innovation in the banking & financial sector. However, it also presents challenges related to security, data privacy, and the need for ongoing adaptation to keep pace with rapidly evolving technology trends. With help of review of literature, the paper identified important opportunities and challenges for digital banking in India from the customers' as well as banks' point of view. For digital banking in India, the important opportunities include increasing number internet and mobile users, government initiatives, entry of fin-tech companies etc. and the important challenges include digital illiteracy, security & privacy, customer preference for cash transactions, non-availability of internet particularly in rural areas. The implementation of more cutting-edge solutions along with technological security measures, the opportunities may be taken advantage of effectively, and the challenges can be readily counterbalanced.

Limitations and future research directions

All the inherent constraints of the secondary data analysis apply to the present study as well because it is based on secondary sources. Further, the study is limited to only papers taken from google scholar and not from

other data bases. Future research based on primary data on these concerns may also be taken into consideration.

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