



 **Ishan Katyal***

Role of Artificial Intelligence and Analytics in Banking

Indian banking and financial sector has, and is still undergoing a major transformation with the advent of information technology. Of all the IT domains that are impacting this industry, Artificial Intelligence (AI) and Analytics are the top-contenders. In the present banking scenario, these stand out to be the solution to a plethora of problems – increasing competition, fraud and cyber security threats, regulatory compliances, improving efficiency of the revenue stream, etc. The present paper highlights the role that can be played by artificial intelligence and analytics in the banking sector. Various literatures have been used in the compilation of what business value can be added by these domains. This paper also mentions the current status of implementation with some examples of banks, challenges involved and recommendations for the banks for its adoption.

Introduction

The past decade has witnessed a widespread acceptance of digital technologies in India. Business verticals across industries are turning to a plethora of modern technologies to streamline their operations. According to PwC's report titled 'Industry 4.0: Building the Digital Enterprise report'¹, nearly 39% of companies in India plan to invest 8% of their annual revenues in digital programmes by 2021. As the Indian government pushes for India to become a USD 5 trillion economy by 2024, it also wants India's digital economy to become USD 1 trillion by 2025².

The banking industry in India is no exception to this radical transformation. It has witnessed major digital alterations in recent years. Most conventional banks

have started partnering with financial technology companies in order to enhance customer experience, manage uncertainty, hedge risk, minimize frauds and thus create business value.

There are various type of technologies that are impacting the Indian financial sector, however artificial intelligence (AI) and data analytics are emerging to be the top-contenders. Both are being used by organizations and governments to improve upon areas such as customer experience, operational efficiency, fraud detection, cybersecurity, risk minimization, among other things.

Developing AI and data analytics infrastructure in India is also a key priority for the Indian Government. NITI Aayog formulated the 'National Strategy for AI' in 2018, to position India as a global leader in AI. The Government has stated that for banks to fulfill India's growing needs, they must harness technologies such as AI and Big Data.

Research Elaborations

There is a growing trend of using data analytics in the financial services industry. Banks are using Artificial Intelligence, analytics and machine learning to improve their operational capabilities, to create new ways of revenue generation and for making data-driven business decisions.³

As per the Top Global Trends for Retail Banking Industry 2019 by the Financial Brand⁴, use of big data, AI and advanced analytics & cognitive computing topped the chart with 54% of the respondents highlighting it as a top trend.

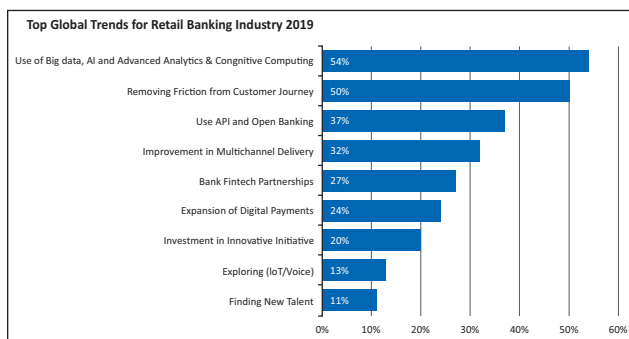
*Manager, Reserve Bank of India, Mumbai.

¹<https://www.pwc.com/gx/en/industries/industries-4.0/landing-page/industry-4.0-building-your-digital-enterprise-april-2016.pdf>

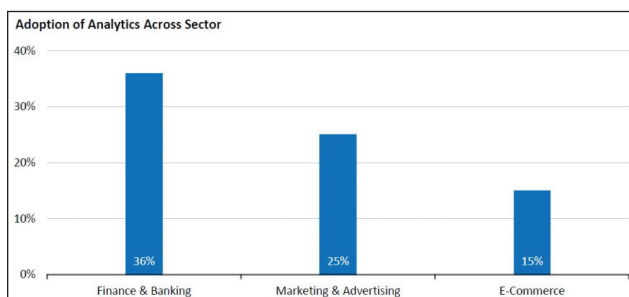
²https://meity.gov.in/writereaddata/files/india_trillion-dollar_digital_opportunity.pdf

³<https://www.decimalpointanalytics.com/resources/insight-detail/361>

⁴<https://thefinancialbrand.com/78423/2019-top-banking-trends-predictions-outlook-digital-fintech-data-ai-cx-payments-tech/>



The concurrence of several technology trends is moving the progress of advanced data analytics forward. The data volume doubles every two years⁵ as information pours in from various channels. The capacity to store data has increased and the cost has decreased. In India, BFSI sector has been at the forefront in the adoption of analytics which has captured around 36% of the market size, according to a study by IVY school.⁶



Artificial Intelligence (AI)

AI is the collection of data, algorithms, and computing power to enable machines to mimic human capabilities and act with higher intelligence. The ability to learn from patterns in text, speech, images, videos and any other data to provide recommendations has made AI ubiquitous in research and industry, including financial services.

Countries across the globe are coming up with national strategies on developing AI, involving guidelines on its usage and identifying changes/introduction of laws. Prominent examples being of countries such as UK, China, USA, Singapore etc.

In the United States of America, the AI strategy has favored innovation over regulation, with big technology corporations rapidly developing technology and introducing self-regulation. The American AI initiative is guided by five principles, which include the following⁷: 1. Steering technological break-through, 2. Steering the progress of technical standards, 3. Training workers with the skills relevant to AI technologies, 4. Protecting American values and promoting public trust in AI technologies, 5. Strengthening US technological advantage in Artificial Intelligence, while advancing an international environment that supports innovation. It is estimated that the US Government has spent USD 1.2 billion in 2020 for non-classified AI research.

In April 2018, the government of the United Kingdom (UK) published their national AI strategy entitled 'AI Sector Deal (United Kingdom, 2018)'⁸. The objective of the AI Sector Deal is to prepare the economy and society for the transformations that AI brings along. It provides the foundations to foster UK's global position as a leader in developing AI technologies. For this purpose, the strategy is focusing on improving UK's position in the following five key areas: Ideas, People, Infrastructure, Business environment, Places. The government has earmarked a budget of £0.95 billion for the implementation of the AI Sector Deal, which is supplemented with £1.7 billion⁹ coming from the Industrial Strategy Challenge Fund.

In March 2017, Japan released its 'Artificial Intelligence Technology Strategy'¹⁰ that includes a roadmap for industrialization and AI development, which is in three phases: (i) the use and application of data-driven AI developed across domains (through 2020); (ii) public use of AI (from 2025-2030); and (iii) creating AI ecosystem of multiplying domains.

Expressing its intent to invest in AI, the Indian government, in its 2018 Union Budget, doubled its past allocation to the Digital India initiative (USD 480 million or Rs 3,703 crore) for the growth of digital technologies. The Government's commitment includes extensive investment in research, training,

⁵<https://www.emc.com/leadership/digital-universe/2014view/executive-summary.htm#:~:text=it%20is%20doubling%20in%20size,zettabytes%2C%20or%2044%20trillion%20gigabytes.>

⁶<http://ivyproschool.com/blog/2019/06/19/an-overview-on-analytics-data-science-industry-india-2019/>

⁷<https://futureoflife.org/ai-policy-united-states/>

⁸<https://www.gov.uk/government/publications/artificial-intelligence-sector-deal/ai-sector-deal>

⁹<https://www.gov.uk/government/collections/industrial-strategy-challenge-fund-joint-research-and-innovation>

¹⁰<https://www.rvo.nl/sites/default/files/2020/12/Artificial-Intelligence-in-Japan-final-IAI.pdf>

and skill development in areas such as AI, big data intelligence, robotics, digital manufacturing, and quantum communications. While most initiatives relate to implementation beyond AI, there are many initiatives that specifically or indirectly impact the banking and finance industry.

The AI Task Force: The Ministry of Commerce & Industry set up the AI Task Force to carve the path forward for use of AI in the country; the Task Force includes members from the private sector, including banking and finance. In March 2018, the Task Force released its report that identified 10 key domains where AI could play a crucial role in India's socio-economic development. The fintech industry is part of the 10 identified domains.

The Ministry of Electronics and Information Technology report on AI: MeitY has set up the following committees to suggest a policy framework for AI: 1. Platforms and Data on AI, 2. Leveraging AI for identifying national missions in key sectors, 3. Mapping technological capabilities, key policy enablers required across sectors, skilling, reskilling, and research and development, 4. Cybersecurity, safety, legal, and ethical issues.

NITI Aayog - National AI Strategy: In the 2018-19 Budget, NITI Aayog was tasked to chart out a National Program on AI. Towards this, the think tank released a discussion paper on National Strategy for AI. The 'AI for All' strategy was focused on leveraging AI for inclusive growth aligned with the Government's aim of development for everyone.

AI in banking

As per the Autonomous Next research by Business Insider Intelligence¹¹, the aggregate potential cost savings for banks from AI applications is estimated at \$447 billion by 2023, with the front and middle offices accounting for \$416 billion of that total. Many banks are planning to deploy solutions enabled by AI, 75% of respondents at banks with over \$100 billion in assets say they're currently implementing AI strategies, compared with 46% at banks with less than \$100 billion in assets, as per UBS Evidence

Lab report¹² seen by Business Insider Intelligence. A Microsoft Asia and IDC Asia/Pacific study specific to the Financial Services Industry (FSI)¹³ found that organizations in the Asia-Pacific that deploy AI expect to see 41% improvement in competitiveness in three years. Certain AI uses¹⁴ have gained importance across banks' operations, with chatbots in the front office and anti-fraud initiatives in the middle office being the top use cases.

According to business insider, the three main channels¹⁵ where banks use artificial intelligence for cost-saving are front office or conversational banking, middle office or anti-fraud and back office or better known as underwriting. Front and middle office applications offer the greatest cost saving opportunities across banks.

At the front end, AI is being used to smoothen customer identification and authentication by mimicking employees through chat bots and voice assistants. AI is also being implemented by banks within middle office functions to detect and prevent payment frauds and to improve anti money laundering and KYC checks. It can be used in the back office to provide business and strategy insights, simplifying the backend process and for regulatory compliance.

In a survey conducted by UBS Evidence lab, bank executives recognized the four most beneficial uses of AI¹⁶ as 1. Automating processes and helping improve efficiency 2. Helps to identify and capitalize on revenue opportunities 3. Fraud detection and security (KYC, AML, cybersecurity) 4. Customer service.

AI enhances customer service: Automated AI powered customer service representatives gather the data from the user's devices and process it through machine learning to provide relevant information. It is easier to show offers, services, and insights which are in line with the user's behavior. It is estimated that by 2022, conversational assistants could help cut operational costs by over USD eight billion across global banks, compared to only USD 20 million in 2017.¹⁵ A key contributor to this will be the reduction in costs in terms of hiring personnel.

¹¹<https://www.businessinsider.in/finance/news/the-impact-of-artificial-intelligence-in-the-banking-sector-how-ai-is-being-used-in-2020/articleshow/72860899.cms>

¹²<https://www.businessinsider.in/finance/news/ai-in-banking-artificial-intelligence-could-be-a-near-450-billion-opportunity-for-banks-here-are-the-strategies-the-winners-are-using/articleshow/74784610.cms>

¹³<https://news.microsoft.com/apac/2019/09/24/asia-pacifics-fsi-organizations-with-ai-expect-41-improvement-in-competitiveness-by-2021/>

¹⁴<https://elexonic.com/2019/12/17/artificial-intelligence-in-banking-2020-how-banks-use-ai/>

¹⁵<https://www.businessinsider.com/ai-in-banking-report>

¹⁶<https://www.businessinsider.in/finance/news/the-impact-of-artificial-intelligence-in-the-banking-sector-how-ai-is-being-used-in-2020/>

AI provides business and strategy insights: AI technology has the potential to analyze and process large amounts of data to drive informed decision making. Based on assessment of data trends using AI, banks can create their portfolio strategies to boost growth. Additionally, transaction data mining of digital payments (including transaction insights, searches and needs) can help in deriving actionable insights.

Fraud detection and Risk management: AI can be used to proactively monitor and identify frauds, cases of money laundering through identifying irregular transaction behavior of individuals, data analysis of spending patterns among others. Online payment fraud losses are expected to jump to USD 48 billion per annum by 2023, compared to an estimated USD 22 billion per annum in 2018. The ability of technology to decode patterns and continuously adapt to recognize new fraud tactics will help banks bolster fraud detection and prevention efficiency and significantly cut costs.

Credit rating and loaning¹⁷: AI enables fintech companies to use alternate sources of information to create a credit score for individuals, like data from earning and spending habits, family history, mobile data usage, etc. For existing customer base, loaning decisions can be made through insights drawn from data entries of banking transactions, financial decisions, social media usage, and web usage to determine creditworthiness.

Regulatory compliance¹⁸: Financial reporting for the purpose of compliance is a complex task, with significant repercussions in case of errors, thus banks invest extensive resources to undertake this activity¹⁹. AI technology can however be harnessed to automate complicated compliance procedures, process and report vast amounts of data for better and a closer oversight, that too at a lesser cost.

Personalized insights: Using chat bots and virtual assistants to attend to customer queries, personalized insights related to wealth management, portfolio management, and financial management can be

provided. Use of AI over time can help in anticipating customer needs more effectively by gathering and processing digital profiles and transaction histories. As a result, personalized product offerings and recommendations can be enabled for maximizing business and also to create better relationships with the customers.

KYC and AML: Non-compliance with sanctions, Know Your Customer (KYC), and Anti Money Laundering (AML) has resulted in global financial regulators issuing fines worth USD 26 billion to financial institutions, including banks in the past decade. To reduce the resource utilization on compliance, banks are investing in AI to streamline their KYC processes and detect AML activities.

Identity Protection: AI systems can analyze biometrics such as fingertips, iris, voice, behavioral and rhythmic patterns to authenticate the users. ATMs can be a useful point of operation to detect frauds through real time identity recognition through AI's deep learning algorithm.

Wealth management: AI helps in understanding customer needs and their risk taking appetite to customize products to cater to their portfolio and wealth management needs. It also makes identification of market trends easier to give insights about the future trends and thus help the potential investor to choose the right portfolio. AI systems can analyze salary, savings, and spending data of customers and draw patterns to formulate customized financial plans catering to a specific individual's needs.

Simplify operations: AI can be used to automate back end operations such as extracting financial information from the relevant financial documents, customer onboarding, compliance monitoring, automating reports for reference, etc. In mobile banking services, credit and debit card management system can be made safer and simpler by operationalizing through AI. It helps the customer to get rid of long authentication processes, saving time and efforts of the customer, along with improving the service.

¹⁷<https://www.netguru.com/blog/ai-and-machine-learning-in-fintech.-five-areas-which-artificial-intelli>

¹⁸<https://mk.eos-solutions.com/en/magazine/RegTechs.html>

¹⁹<https://www.fintechfutures.com/2018/12/how-technology-and-ai-are-set-to-transform-compliance/>

Current State in India for AI in banking

Banks can mine the financial transaction data to better monitor, predict and respond to consumer behavior. The rising demand for online banking and financial information offerings has created opportunities for AI implementation in India's banking sector. In 2019, an inter-ministerial panel on fintech suggested increasing the levels of automation using AI, cognitive analytics, and ML in their backend processes²⁰.

In Feb 2018, Reserve Bank of India's (RBI) inter-regulatory working group released a report²¹ categorizing the use of AI and robotics in data analytics and risk management as one of the major fintech innovations. The report states that the digital transformation of the banking and financial sector would ride on three pillars: Blockchain, AI and the Internet of Things (IoT).

Analytics

Data analytics (DA) is the science of examining the unstructured data with the aim of extracting meaningful information to support decision making. As the role of technology increases in every sector, it generates huge amounts of data²² that can yield to valuable insights about the field. Data analytics is an integral component of making strategies in all major organizations as it supports them to predict customer trends, increase productivity of business, and make decisions backed on data evidences²³.

Various countries all over the world are investing in analytics. In Singapore, Pulse of the Economy²⁴, an initiative by the Government Technology Agency of Singapore (GovTech) in collaboration with various government economic agencies, uses high-frequency big data to develop new indicators to "nowcast" the economy. It draws from varied non-traditional sources of data, from Ez-link taps on the rail system to electricity consumption information, and even social media sentiments, to "nowcast" the economy.

The market of data in the United Kingdom (i.e. capital gained from products or services derived from digital data) is the largest in Europe. Tech in UK grew aggressively in 2019, with the UK securing 33% of European technical investment. The national data strategy of UK builds upon initiatives such as the Industrial Strategy, the AI Review, the AI Sector Deal and the Research and Development Roadmap.²⁵

The Indian government reached out data experts to create policy interventions for economic reforms relying on data analytics. Project Insight²⁶ is one such example, where a data mining platform to catch tax evaders was created, through which ~50,000 entities were recognized²⁷, which were acting as black money enablers. Another example is of GSTN, which gives detailed insights into how the trade is getting conducted in India. The Reserve Bank of India has also announced the setup of a data analytics lab for in-house analysis.²⁸

Analytics in Banking

The banking industry uses intensive data with typically massive amounts of processing inputs. As banks face pressure to stay profitable, comprehending data and using it for better performance becomes a critical factor. New methods of proactive risk management are being increasingly embraced by major banks and financial institutions, especially in the coming around of Basel accord. Through Data mining and advanced analytics, banks are better decked to manage market unpredictability, minimize fraud, and control risk²⁹.

According to IBM's 2010 Global CEO Study³⁰, 89% of financial markets and banking CEOs say their priority is to understand, envisage and provide customers what they want. But to discover the set of success factors that will enable banks to reach their strategic goals, they require application of data mining and analytics to extract actionable and intelligent insights. Banks can gather insights that include all types of

²⁰<https://government.economictimes.indiatimes.com/news/digital-payments/fintech-panel-suggest-legal-framework-to-protect-digital-services-consumers/70948919>

²¹<https://m.rbi.org.in/Scripts/PublicationReportDetails.aspx?UrlPage=&ID=892>

²²<http://www.intelligenthq.com/importance-data-analytics-modern-world/>

²³<https://worldscholarshipforum.com/best-online-masters-data-analytics/>

²⁴<https://www.tech.gov.sg/media/media-releases/newly-launched-govtech-to-transform-public-service-delivery-with-citizen-centric-digital-services-and-products>

²⁵<https://www.gov.uk/government/publications/uk-national-data-strategy/national-data-strategy>

²⁶<https://report.insight.gov.in/reporting-webapp/portal/recentArticle>

²⁷<https://www.analyticsinsight.net/how-indian-government-is-using-big-data-analytics-to-improve-economy-and-public-policy/>

²⁸<https://yourstory.com/2018/04/rbi-set-data-sciences-lab-december2018#:~:text=The%20Reserve%20Bank%20of%20India,will%20aid%20in%20policy%20formulation.>

²⁹<https://www.ibmbigdatahub.com/blog/analytics-banking-services>

³⁰<https://www-03.ibm.com/press/us/en/pressrelease/31670.wss>

customer trends. It can be done through multivariate, predictive and banking analytics amongst others. The importance of these have been put up in the Basel II accords that emphasize the requirement to accept credit management methodologies in order to manage market unpredictability and minimize risk.

As per Deloitte research, there are 3 major business drivers which increase the importance of analytics within the banking industry:

1. **Regulatory Reform:** Major legislations such as the Basel III, have changed the business environment for banks. Given the attention towards systemic risk, regulators are aggressively pushing banks to exhibit better understanding of data they possess, convert data into actionable information that supports business, and manage risk better. Each request has major effect on data governance and reporting. Regulations will be modified in due time, however, banks need to start transforming their business structures today to comply with radically different regulatory policies.
2. **Customer profitability:** Customized offerings according to the customer are expected to play a huge role in attracting and keeping profitable customers.
3. **Operational efficiency:** While banks have trimmed a lot of excess resources over the past few years, there is still plenty of area for improving further, including reducing duplicate systems, manual reconciliation and IT costs.

Analytics can be used in Banking in various capacities:

Fraud analysis: The Association of Certified Fraud Examiners' 2010 Global Fraud Study³¹ found that the banking/financial services industry had the most cases among all industries – accounting for more than 16% of frauds. Fraud detection in banking is a critical activity that includes fraudulent activity from customers to bank employees.³² Since banking is one of the most regulated industry, there are also a plethora of external compliance regulations that banks must adhere to fight against frauds. In the

sample study conducted by ACFE, which was quoted above, it was seen that most of the frauds happened due to Cash in hand and corruption.

Calculation of statistical parameters to identify outliers that could indicate fraud, classification of patterns among data elements, stratification of numbers to identify unusual entries, digital analysis using Benford's law, duplicate testing, gap testing to identify missing values in sequential data and validating data entries can be some of the methods which can be enabled through data analytics.

Customer analytics: Banks and credit unions are constantly at risk of losing customers, due to plethora of options and ever evolving offerings. In order to stem the flow, they may offer their best customers better rates, waive annual fees and provide priority treatments. However, these retention strategies have costs³³ and it is difficult to customize it at the customer level. The success of these strategies is dependent on devising the right action plan for the right customer. As we move forward towards a cashless economy, the future of banking will be made by how the virtual and physical worlds of banking come together. More adept banks will increasingly invest in customer analytics to gather new customer insights and effectively segment them. The data can be analyzed to reveal habits, preferences and needs, which will help the banks in determining pricing, new products and services, the right customer approaches and marketing methods, like which channels customers are most probable to utilize and how probable are customers to have more than one provider or even change providers. Using Big Data analytics, banks can segregate their set of clients³⁴ based as per their demography, including investment or buying patterns. Such segmentation benefits the banks when it comes to marketing to target audiences, and to help improve customer relationships.

Risk Analytics: Accenture conducted a study which synthesized the insights from more than 450 risk management analytics professionals in three industries³⁵ to examine how they used risk analytics to counter industry challenges and volatility of the

³¹https://www.acfe.com/uploadedFiles/ACFE_Website/Content/documents/rtn-2010.pdf

³²<https://www.ibmbigdatahub.com/blog/analytics-banking-services>

³³<https://www.ibmbigdatahub.com/blog/analytics-banking-services>

³⁴<https://expressanalytics.com/blog/growing-role-of-finance-analytics-in-banking-5222018/>

³⁵<https://www.accenture.com/us-en/insights/financial-services/global-risk-study>

market. The study was supposed to assess the current level of maturity of their risk analytics—their qualitative and quantitative techniques formulated to estimate the frequency and corresponding impacts of risks, as well as their ability to use analytics to drive business outcomes and manage rewards. Across the industries which were studied, banking industry is predicting the highest increase in investment in risk analytics, with 73 percent of respondents predicting rise in expenditure of greater than 10%. In terms of specific capabilities, risk analytics spending is expected to increase mostly in areas of data quality, modelling and systems integration. Risks come in various forms – bad loans, investments that have not worked out, fraudulent activities, etc. Of late, global banks are under great pressure because of competition³⁶ from non-banking entities, yields of low asset and increased commercial borrowings. All these factors represent a risk percentage for the bank, and early detection of these can make sure that the bank doesn't undergo major losses. As the competition for customers intensifies, a greater number of loans tend to get underwritten by the banks (with lenient lending restrictions). Analytics can help in mitigating this.

Case Study of Indian Banks

State Bank of India: It had collaborated with IIM-B, IIM-C, IDBRT and Manipal University to further strengthen their pursuit of analytics and AI in 2014-16. Today, the bank has a comprehensive organizational structure in place to integrate AI, Machine Learning (ML) and Analytics to address a variety of business and operational problems. They are using python and R, using techniques such as collaborative filtering, natural language processing, string matching, K means clustering, network analytics, XG boost among others to develop models to identify frauds, early warning systems and recommendation engines. Using SPSS and techniques such as logistical regression, linear prediction, random forest, they are developing models to issue prepaid credit cards (project Shikhar), pre-approve personal loans, business loans, car loans, generate new leads, takeover loans among other initiatives.

Punjab National Bank: They have set up an in-house data analytics center to operationalize analytics. The

bank embarked on a mission to leverage Big Data, AI and ML models to deploy end-to-end solutions in: (i) product, sales and customer acquisition, (ii) channel and campaign management, (iii) customer lifetime value, (iv) sentiment analysis for improving customer satisfaction, (v) adoption of digital services across the customer lifecycle journey, (vi) branch performance management, (vii) operations, customer service and processes, (viii) risk, collections and compliance, and (ix) fraud detection and prevention.

They have also utilized AI/ML and data analytics tools to address credit card default prediction, review customer credit ratings, slippages in Mudra loan, identifying next best offers for various customer segments, and identifying fraudulent transactions through various channels.

Bank of Baroda: Analytics and ML have been at the core of the bank's revenue programmes over the past two years. The bank's cross-selling and upselling opportunities in Retail, MSME, Liability and Wealth Management are driven by a significant number of ML and predictive models to deliver cross-channel go-to-market strategies. Self-service campaign tracking dashboards provide near real-time updates on different campaigns. Several initiatives are being planned for the coming years. These include multiple new use-cases in complex areas of digital enablement of stakeholders; hyper-personalization of offers and activities; automation of decision making; uptake of digital channels; and the continued integration of internal and external data sources to power these.

ICICI Bank: Some of ICICI Bank's use cases for AI and ML include Zero credit touch strategies, where without any credit intervention and additional information, credit facilities can be provided; Portfolio management, for prudent debt service management, where the bank uses segmentation models to identify potential defaulters. They also use Fuzzy matching logic employed for finding additional contact details of the non-contactable customers. They have also developed an in-house BI solution which includes components of SAS, Sybase, TRIAD, Posidex, Data Clean, and Blaze Advisor that factored in several parameters such as efficiency of collector, customer profile, risk behaviour and exposure.

³⁶<https://expressanalytics.com/blog/growing-role-of-finance-analytics-in-banking-5222018/>

HDFC Bank: It has created an AI-based chat bot, “Eva”³⁷, made by Senseforth AI Research. Eva can collate data from thousands of sources and provide answers within 0.4 seconds. Going forward, real banking transactions³⁸ would be handled by Eva as well. HDFC has also launched a prototype robot IRA (“Intelligent Robotic Assistant”). It is working on implementing Artificial intelligence to handle data, security purposes and computing scalability.

Citi Bank: Citi Bank uses logistic regression models that are part of AI and ML to identify high propensity customers to target their products. The bank also uses similar models to estimate prices for eligible customers by taking care of propensity and risk-based pricing. The ML models are being used for cash optimization at the ATM level to identify cash demand and optimize the idle cash level in the ATM network, thereby bringing down the idle cash in ATMs by around 15%.

Axis Bank: Axis Bank also uses analytics to increase customer loyalty and reduce loan prepayments due to refinancing with other institutions. It also uses SAS to provide customer intelligence across the organization. The SAS tool also helps the bank to improve risk management throughout the organization by giving them early warning signals.

Challenges in adoption of AI and Analytics

According to a joint research conducted by the National Business Research Institute and Narrative Science³⁹, about 32% of financial service providers in India are already using AI technologies such as voice recognition and predictive analytics. Banks such as BoB, SBI, ICICI, HDFC, Yes Bank and others are already deploying artificial intelligence to streamline their day-to-day processes. According to a Accenture banking technology vision report⁴⁰, 83% of Indian bankers believe that AI will work alongside humans in the next couple of years. However, the report also noted that 77% of Indian bankers agreed that they have to develop and implement AI tools in banking services. The adoption of AI in the Indian banking system can be further enhanced by addressing the following challenges:

1. **Trained manpower:** Due to the unavailability of professionals with requisite data science skills and trained human resources, the banking industry needs to work with the top Indian universities to develop skilled data scientists. Universities in various countries, including the USA and UK, are beginning to adapt to the changes that AI is bringing about in the finance sector by offering undergraduate and masters programmes in fintech. In India, HDFC Bank has launched a programme in partnership with engineering and MBA colleges to educate students on emerging banking technologies.
2. **Data standardization:** Non-uniform digitisation of data will lead to issues on interoperability of the individual services as well as their usability.
3. **Different approaches of enforcement:** Differing enforcement approaches make it hard for firms to adopt effective global standards and to quantify their risk of rolling out AI innovations internationally.
4. **Data protection and privacy:** According to a report by the Data Security Council of India, India faced the second-highest number of cyber-attacks between 2016 and 2018. AI systems require huge amounts of training data as inputs. Consumer data is continuously collected by tracking online and offline consumer behavior to generate big data sets and extract further information about consumers through profiling. This creates a huge risk to data privacy.
5. **Languages:** Given multiplicity of languages in India, it becomes a challenge to create a system to enable communication services in vernacular languages while simultaneously training the machine to read the same.

Recommendations for banks to adopt AI/ analytics

Pre adoption: There should be organizational readiness to accept the adoption by the bank by communicating the workforce that the system will complement the work and will help improve productivity.

³⁷<https://www.fintechnews.org/how-will-artificial-intelligence-change-the-banking-industry/>

³⁸<https://www.livemint.com/Industry/k81A1gY0EHKhv3TutKs5TN/HDFC-Bank-launches-chatbot-Eva-for-customer-services.html>

³⁹https://narrativescience.com/wp-content/uploads/2018/11/Research-Report_The-Rise-of-AI-in-Financial-Services_2018.pdf

⁴⁰https://www.accenture.com/gb-en/_acnmedia/PDF-78/Accenture-Banking-Technology-Vision-2018.pdf

An impact study pre-adoption will also be beneficial as it is a huge investment in terms of data storage, talent hiring, security, etc.

During adoption: High priority should be given to data privacy and security, and data protection becomes of paramount importance.

Sound training should be given to the involved stakeholders.

The design of the system should be ethical as deep learning capabilities can do unintentional harm. There should be transparency built into the system.

The data presented can create a bias to a particular section of human activity, thus fairness, accountability and transparency should be given high importance.

Conclusion

India's digital banking and finance sector, has witnessed huge growth in the last decade. This transformation has primarily been driven by the proliferation of digital banking initiatives – which has helped to generate data that banks can use to monitor, predict, and respond better, thus opening up opportunities for AI and analytics implementation in banking. Data-driven decision-making use of AI and analytics can help banks across a range of functions for improving overall customer experience, making more informed decisions on credit underwriting, detecting frauds and defaults early, improving collections and increasing employee efficiency. However, there are still some challenges that need to be addressed to increase the adoption in the Indian banking and finance industry.



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Articles should be sent to:

The Editor: Bank Quest
Indian Institute of Banking & Finance,
Kohinoor City, Commercial-II, Tower-1, 2nd Floor,
Kiorl Rd., Kurla (W), Mumbai - 400 070, INDIA.

Objectives:

The primary objective of Bank Quest is to present the theory, practice, analysis, views and research findings on issues/developments, which have relevance for current and future of banking and finance industry. The aim is to provide a platform for Continuing Professional Development (CPD) of the members.

Vetting of manuscripts:

Every article submitted to the Bank Quest is first reviewed by the Editor for general suitability. The article may then be vetted by a Subject Matter Expert. Based on the expert's recommendation, the Editor decides whether the article should be accepted as it is, modified or rejected. The modifications suggested, if any, by the expert will be conveyed to the author for incorporation in case the article is considered for selection. The author should modify the article and re-submit the same for the final decision of the Editor. **The Editor has the discretion to vary this procedure.**

Features and formats required of authors :

Authors should carefully note the following before submitting any articles:

- 1) **Word length:**
Articles should generally be around 2000-3000 words in length.
- 2) **Title:**
A title of, preferably, ten words or less should be provided.
- 3) **Autobiographical note and photograph:**
A brief autobiographical note should be supplied including full name, designation, name of organization, telephone and fax numbers,

and e-mail address (if any), or last position held, in case of retired persons. Passport size photograph should also be sent along with the submission.

4) **Format:**

The article, should be submitted in MS Word, Times New Roman, Font Size 12 with 1½ line spacing. A soft copy of the article should be sent by e-mail to publications@iibf.org.in

5) **Figures, charts and diagrams:**

Essential figures, charts and diagrams should be referred to as 'Figures' and they should be numbered consecutively using Arabic numerals. Each figure should have brief title. Diagrams should be kept as simple as possible. In the text, the position of the figure should be shown by indicating on a separate line with the words: 'Insert figure 1'.

6) **Tables:**

Use of tables, wherever essential, should be printed or typed on a separate sheet of paper and numbered consecutively using Arabic numerals (e.g. Table-1) and contain a brief title. In the body of the article, the position of the table should be indicated on a separate line with the words 'Insert Table 1'.

7) **Picture/photos/illustrations:**

The reproduction of any photos, illustration or drawings will be at the Editor's discretion. Sources should be explicitly acknowledged by way of footnote, all computer-generated printouts should be clear and sharp, and should not be folded.

8) **Emphasis:**

Words to be emphasised should be limited in number and italicised. Capital letters should be used only at the start of the sentences or for proper names.

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