AI Revolution
in Indian Banking

Contents

Foreword

In the six decades since the term "Artificial Intelligence" (AI) was conceived, it has evolved from an other-worldly idea that machines could "think," to a technology that is pervasive and penetrating every aspect of daily life in countless practical applications. In today's world, human beings cannot escape AI. From getting weather information through voice assistants like Amazon's "Alexa," to arranging travel from helpful online chatbots, AI solutions offer a quick, easy and convenient experience.

It's not surprising then that consumers have begun to demand this type of experience across the board, especially from their banks and other financial services providers. The industry has responded in turn, increasing investments in AI-related startups and firms in India and across the world.

Indian banks are slowly, but surely, adopting AI technologies. Almost two-thirds of banks implementing AI are doing so on a large scale instead of running test pilots. The deployment of AI in the banking sector covers the entire value chain from front office to middle and back office, signifying just how critical a part of banking it has become.

However, there is still a huge untapped potential for the technology to further transform as well as improve several processes across retail and commercial banks, and Capital Markets firms.

All the major stakeholders of a bank are seeing significant benefits of AI deployment, ranging from an enhanced customer experience and a higher operational efficiency to substantially lowered costs from various banking processes.

But along with these multiplying benefits come critical challenges that are, for now, inherently associated with this evolving technology, and need to be treated with extreme care. Banks need to tackle serious questions around data quality and security, technology preparedness for the imminent AI ecosystem, a looming talent crunch, and complex and evolving regulations. In addition, there are also the less-recognized societal level impacts, such as disruption of the workforce and discrimination due to unexpected biases in system development.

Despite these challenges, it is evident that AI is here to stay and be a formidable force in the future.

Moreover, with the Indian government's steps to move towards a digital, cashless economy, the sky is the limit for Indian banks that take advantage of these government initiatives to create innovative AI offerings and differentiate themselves. To be successful, banks must carefully execute an enterprise-wide transformation resulting from AI by starting with the right plan and resources.

A bank's strategy for a successful deployment must holistically ensure top management level buy-ins, a well-planned governance structure, and prioritized implementation of AI use cases that offer maximum benefit with minimal pain. The customer impact as an outcome must always remain as the cornerstone of the bank's AI journey, instead of myopic targets of return on investment (ROI). Lastly, there is immediate need for CXOs to realize that employee participation at organization level is a critical success factor if the bank wishes to fully leverage the AI revolution.

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1. Introduction

When Alan Turing first published a paper in 1950 where he spoke of creating machines that could think like human beings, he could hardly have imagined the leaps and bounds this initial idea would take over the next several decades.
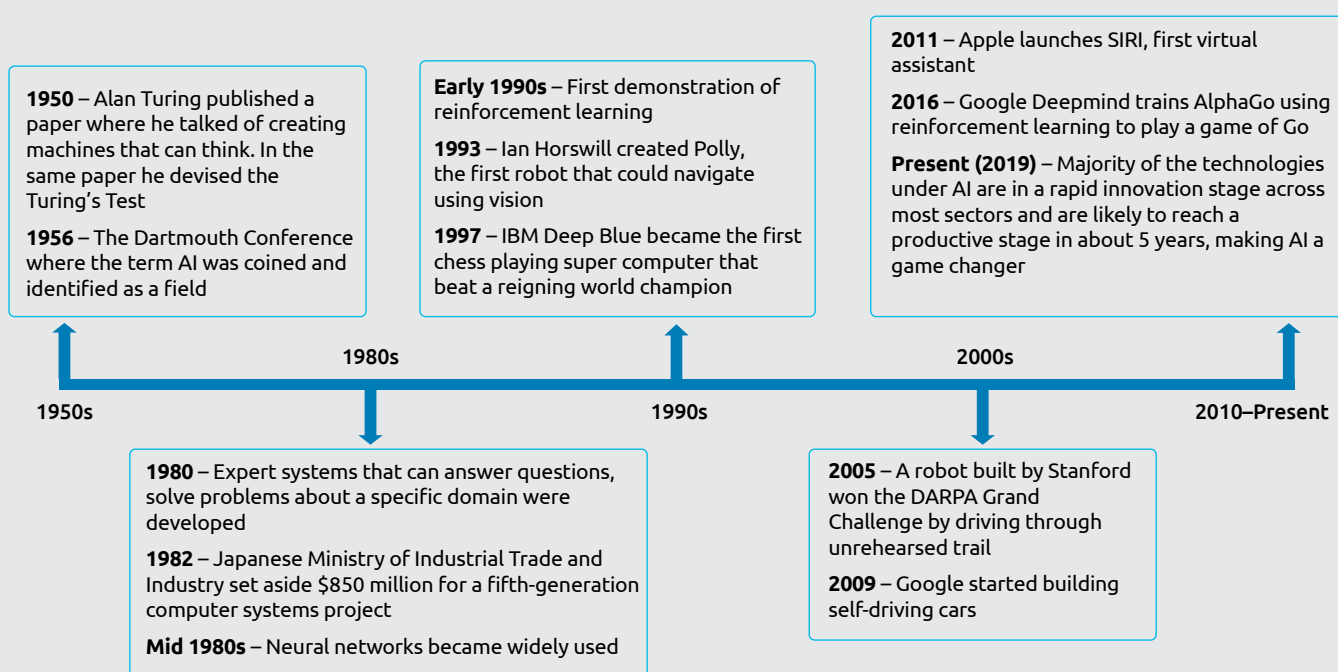
Turing's concept formed the basis for technology that is now revolutionizing every industry it touches – **Artificial Intelligence (AI)**, the field that creates and develops computer systems to perform tasks normally requiring human intelligence. AI applies machine intelligence to augment human capabilities and enhance human performance, allow effective collaboration between man and machine, and improve overall business and societal results.
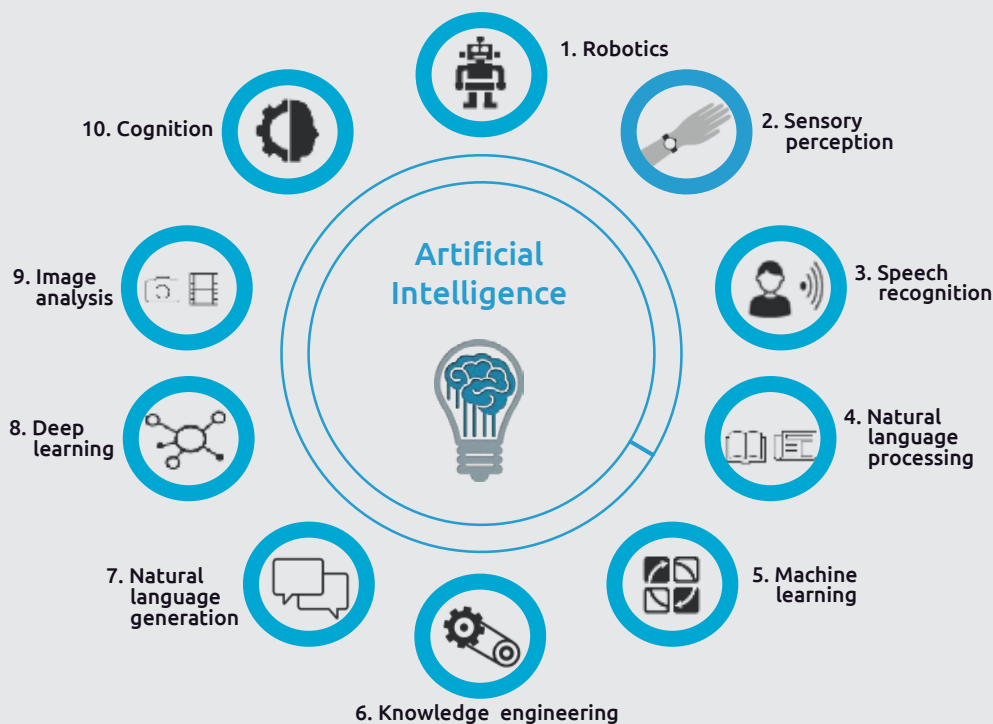
Brief History of AI Technology

AI has evolved over the years (Figure 1.1) from the first robot that could navigate by "seeing," to the first super computer capable of beating the reigning world champion in chess, to the ubiquitous virtual assistants around today.

Figure 1.1: Evolution of AI

1950 – Alan Turing published a paper where he talked of creating machines that can think. In the same paper he devised the Turing's Test

1956 – The Dartmouth Conference where the term AI was coined and identified as a field

Early 1990s – First demonstration of reinforcement learning

1993 – Ian Horswill created Polly, the first robot that could navigate using vision

1997 – IBM Deep Blue became the first chess playing super computer that beat a reigning world champion

2011 – Apple launches SIRI, first virtual assistant

2016 – Google Deepmind trains AlphaGo using reinforcement learning to play a game of Go

Present (2019) – Majority of the technologies under AI are in a rapid innovation stage across most sectors and are likely to reach a productive stage in about 5 years, making AI a game changer

1980 – Expert systems that can answer questions, solve problems about a specific domain were developed

1982 – Japanese Ministry of Industrial Trade and Industry set aside $850 million for a fifth-generation computer systems project

Mid 1980s – Neural networks became widely used

2005 – A robot built by Stanford won the DARPA Grand Challenge by driving through unrehearsed trail

2009 – Google started building self-driving cars

1950s   1980s   1990s   2000s   2010–Present

Source: World Economic Forum, New Physics of Financial Services, August 2018

Figure 1.2: Technologies under the AI umbrella

Some of the most impacting AI technologies (Figure 1.2) include:

- **Natural Language Generation (NLG)** – used to automate report generations, enhance customer service, summarize business intelligence, and more.
- **Speech Recognition** – used in Interactive Voice Response (IVR) systems to understand, transcribe, and transform human speech into a usable format for further analysis.
- **Virtual Agents** – most commonly deployed in customer-facing or employee-facing websites as chatbots.
- **Machine Learning (ML) Platforms** – used in pattern recognition scenarios across large data sets. Most commonly used to identify money laundering, develop customer segmentation, generate forecasts, and more.
- **Deep Learning (DL) Platforms** – implemented for image and video recognition, auditory analysis, fraud detection and risk analysis.

- **AI-Optimized Hardware** – used to run a variety of ML/DL algorithms. It is also capable of running computation in parallel and build more efficient models.
- **Decision Management** – uses decision trees to arrive at a decision and then implement an action.
- **Biometrics** – capable of capturing facial expressions, body language and other physical characteristics. One of the most common applications is fingerprint and facial recognition locks on mobile phones.
- **Robotic Process Automation (RPA)** – implemented to lower costs and increase efficiency by leveraging machines to automate repetitive tasks previously carried out by humans[1].
- **Text Analytics and Natural Language Processing (NLP)** – Used for sentiment analysis, query processing, knowledge management, and more.

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1 Capgemini Research Institute, Growth in the Machine, July 2018
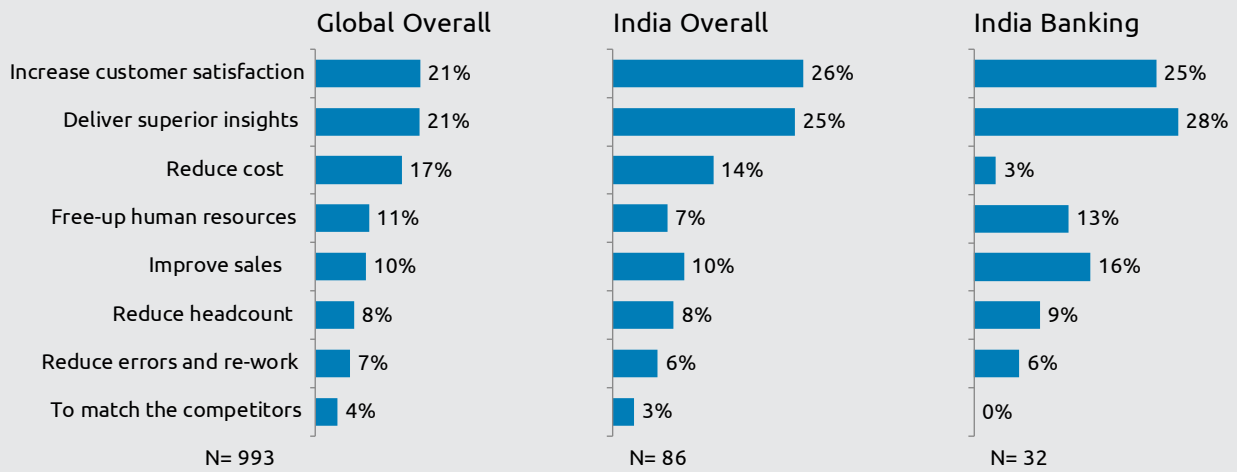
AI in Finance

In the financial services industry, AI technologies are highly influential across several sectors, including banking, payments, wealth management and insurance, and used in front-, middle- and back-office applications.

Globally, incumbent financial services organizations and newer entrants, such as FinTechs and BigTechs, are all unlocking and harnessing the power of AI by innovating and developing technologies that are forecasted to reach a productive stage within five years. This global trend is also evident in India, where the funding for AI start-ups has been growing exponentially over the last five years, compared to more modest increases for global AI start-ups. From 2013-2017, AI funding in India has had a Compound Annual Growth Rate (CAGR) of 129%, compared to a global CAGR of 40%[2].

With customers worldwide demanding a personalized banking experience through their channel of choice, it's no wonder that Indian AI start-up investment is driven in large part by a desire to increase customer satisfaction. Approximately 25% of Indian banking firms that are investing in AI are doing so primarily to increase customer satisfaction. This is only topped by a desire to deliver meaningful insights (28%). Indian firms' least likely reasons for AI investment include reducing costs and matching the competition (Figure 1.3)[3].

Figure 1.3: Major Driver of AI Investments, 2017

	Global Overall	India Overall	India Banking
Increase customer satisfaction	21%	26%	25%
Deliver superior insights	21%	25%	28%
Reduce cost	17%	14%	3%
Free-up human resources	11%	7%	13%
Improve sales	10%	10%	16%
Reduce headcount	8%	8%	9%
Reduce errors and re-work	7%	6%	6%
To match the competitors	4%	3%	0%
	N= 993	N= 86	N= 32

Source: Analysis based on Capgemini Research Institute Report, "Turning AI into concrete value: the successful implementers' toolkit, 2017"
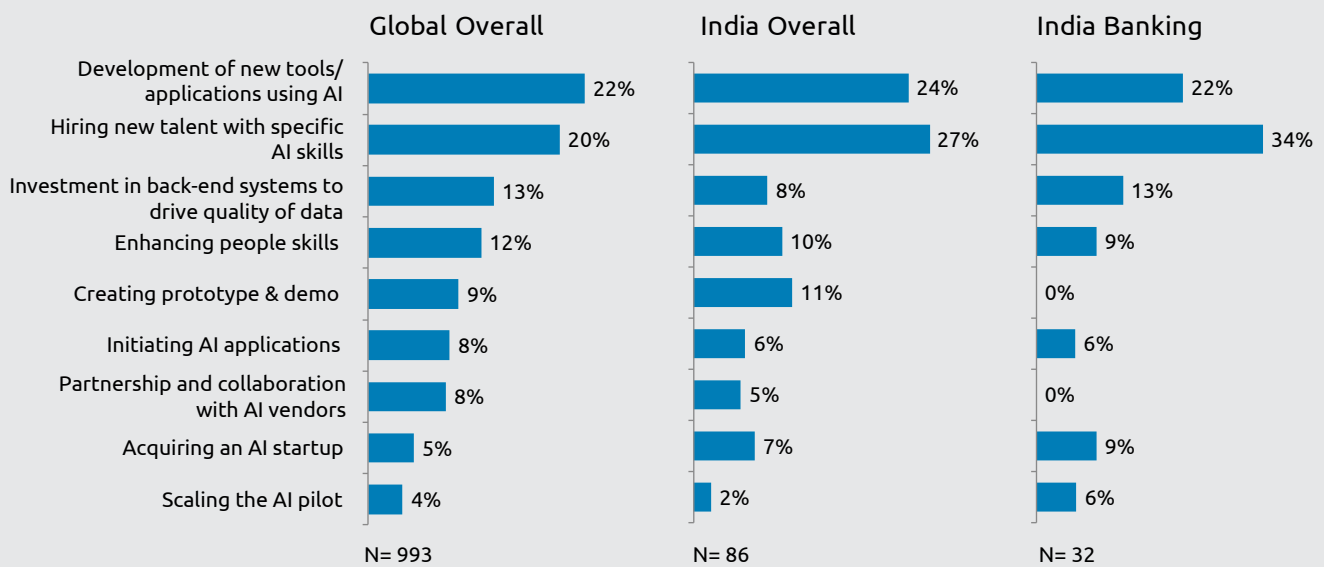
2 NASSCOM, Artificial Intelligence Primer, July 2018
3 Analysis based on Capgemini Research Institute Report, "Turning AI into concrete value: the successful implementers' toolkit, 2017

2. AI in Banking

Knowing that they cannot afford to waste any more time sitting on the sidelines, Indian firms are instead jumping right into the game, by either actively deploying, or forgoing test pilot runs for large scale AI initiatives. Of the Indian firms implementing AI, nearly 60% are doing so at scale, compared to 35% of their global peers[4].

Indian banking firms are also carefully balancing their AI investments between the actual technology itself and the human skills needed to employ it (Figure 2.1). Approximately 34% of firms are choosing to invest in hiring new talent with AI-specific skillsets, while more than one-fifth of firms are focusing investments on developing new tools and applications using AI.

Figure 2.1: Major AI Investment Areas, 2017

	Global Overall	India Overall	India Banking
Development of new tools/applications using AI	22%	24%	22%
Hiring new talent with specific AI skills	20%	27%	34%
Investment in back-end systems to drive quality of data	13%	8%	13%
Enhancing people skills	12%	10%	9%
Creating prototype & demo	9%	11%	0%
Initiating AI applications	8%	6%	6%
Partnership and collaboration with AI vendors	8%	5%	0%
Acquiring an AI startup	5%	7%	9%
Scaling the AI pilot	4%	2%	6%
	N= 993	N= 86	N= 32

Source: Analysis based on Capgemini Research Institute Report, "Turning AI into concrete value: the successful implementers' toolkit, 2017"
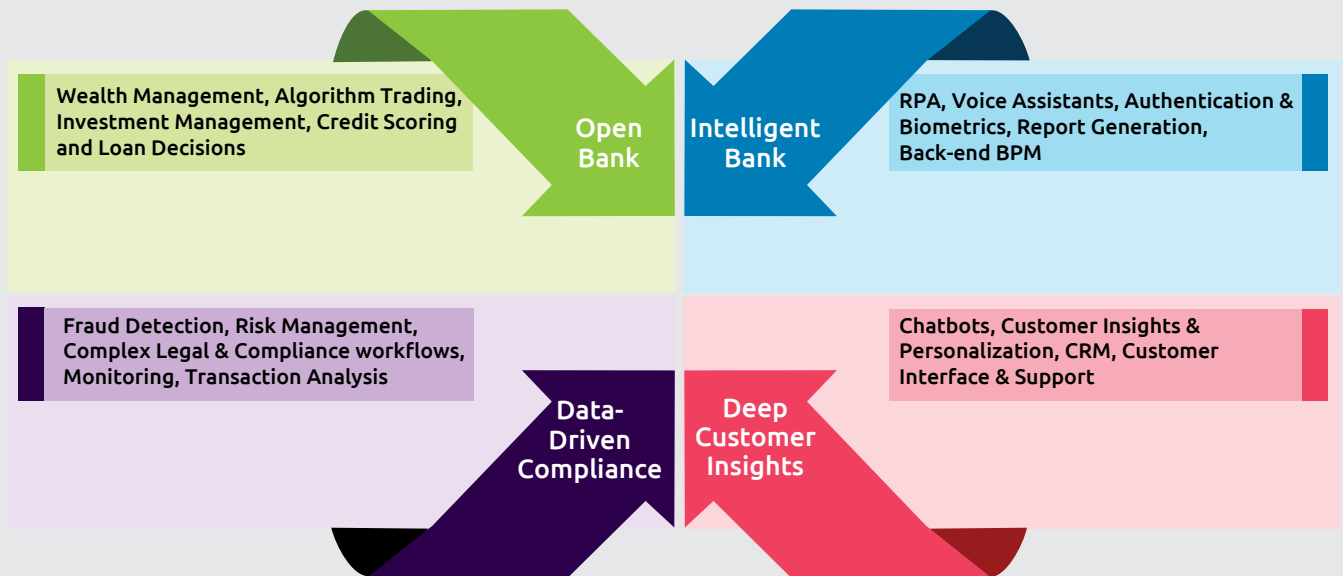
4 Analysis based on Capgemini Research Institute Report, "Turning AI into concrete value: the successful implementers' toolkit, 2017

What are Banks' Best Outcomes with AI?

While AI's evolving technology holds seemingly endless possibilities, Capgemini has found that banks are currently deploying AI solutions to help them achieve four major outcomes (Figure 2.2.).

Figure 2.2: Major Areas Where Banks are Deploying AI

Wealth Management, Algorithm Trading, Investment Management, Credit Scoring and Loan Decisions → **Open Bank**	**Intelligent Bank** ← **RPA, Voice Assistants, Authentication & Biometrics, Report Generation, Back-end BPM**
Fraud Detection, Risk Management, Complex Legal & Compliance workflows, Monitoring, Transaction Analysis → **Data-Driven Compliance**	**Deep Customer Insights** ← **Chatbots, Customer Insights & Personalization, CRM, Customer Interface & Support**

Create an Open Banking model

Banks are leveraging open APIs in open banking models to drive the creation of innovative services in the Front and Back office.

On the front-end, machine learning-based predictive models can aid in *Wealth Management*. These models are constantly analyzing data to help investors with product-portfolio optimization. They can also deliver insights on future price fluctuations. These AI-based systems can analyze cashflows, spending and savings to predict future behavior.

AI is also being used in high-frequency *Algorithmic Trading*, where inputs are taken from multiple financial markets to make investment decisions in seconds.

On the back-end, AI is being used in *Investment Research and Management*, with investors using alternative data sets, leveraging machine learning to effectively comb massive quantities of market data and identifying patterns for guidance on stock picking decisions, research and portfolio management.

Banks are also leveraging Big Data, Data Science and machine learning in *Credit Scoring and Loan Decisions.* The direct, indirect, publicly available and behavioral data of customers, as well as their spending patterns, can be analyzed to confirm creditworthiness. Currently, Bengaluru-based microfinance company **Finomena**[5] makes lending decisions based on developed risk portfolios, while startups like **Monsoon Credit Tech**[6] and **Capital Float**[7] assess MSME creditworthiness to reduce defaulting risk.

5 The Economic Times – "Want a loan to buy that costly gadget but don't have a credit score? Startup Finomena offers help", Nilanjana Chakraborty, September 19, 2016, accessed December 2018 at https://economictimes.indiatimes.com/wealth/spend/want-a-loan-to-buy-that-costly-gadget-but-dont-have-a-credit-score-startup-finomena-offers-help/articleshow/54376854.cms

6 The Economic Times – "Making a Facebook Post? Monsoon CreditTech can determine your credit rating from it", Pranbihanga Borpuzari, July 20, 2017, accessed December 2018 at https://economictimes.indiatimes.com/small-biz/startups/making-a-facebook-post-monsoon-credittech-can-determine-your-credit-rating-from-it/articleshow/59678198.cms

7 The Economic Times – "Capital Float to give loans to vegetable sellers, other SMEs", Pratik Bhakta, October 23, 2017, accessed December 2018 at https://economictimes.indiatimes.com/small-biz/sme-sector/capital-float-will-lend-to-kiranas-vegetable-sellers/articleshow/61178880.cms

Become an Intelligent Bank

By using RPA, machine learning and other intelligent technologies, banks are adopting an "AI-First" perspective to create innovative services and improve internal efficiencies. Moreover, they are infusing design thinking into the process and crafting a unique "AI Reimagine" philosophy that gives rise to products and interfaces that are customer-friendly.

In the middle office, banks are steadily increasing adoption of *RPA,* as robots are being deployed to take over high volume, repetitive and manual processes to reduce errors, save time, and enhance efficiency and accuracy. In doing so, RPA is also reducing processing cost by 30%-70%[8]. RPA can streamline loan processing, account opening, credit assessment and more. In India, start-up **Signzy**[9] is helping banks with AI and RPA-assisted onboarding solutions, while **ICICI Bank** is using an in-house RPA solution to assist with literature formatting, email sorting, text mining and data entry[10].

Natural Language Generation (NLG) is being deployed to generate reports by synthesizing large structured data and converting it into a narrative. For example, NLG can be used to ingest raw data from a quarterly sales report and then write a new report distilling the key points. This saves a human analyst time from poring through raw data, searching for high and low points and calculating CAGRs and rates of change.

Voice Assistants (VAs) are being utilized in the front office to support questions on account balances, payments and bills. With an estimated INR 100 crore voice-and-speech recognition market in India in 2018, and more than 150 million internet users in India likely to own a digital VA by 2019[11],

it would be beneficial for banks to identify relevant use cases and design experiences around VAs that can enhance a customer's banking experience. Currently, **SBI** Intelligent Voice Assistant (SIVA), helps customers with everyday banking tasks just like a bank representative. **HDFC Bank** in India is experimenting with Amazon's Alexa to allow tech-savvy customers to check balances, find payment deadlines and pay bills. HDFC Bank also has a chatbot that works with Google's virtual assistant to answer customer questions[12]. The Chennai branch of **City Union Bank** piloted a humanoid robot that would answer generic banking-related questions from customers[13].

Additionally, in the front office, Indian banks are aggressively utilizing *biometric recognition* in the form of fingerprints, voice patterns, iris scans and facial geometry. According to a report, the biometrics market in India will grow at a CAGR of 31% from 2016-2021 and will surpass USD $3 billion by 2021[14]. Highly secure and cost-effective for banks, biometrics lift the burden of remembering passwords, PINs and card numbers. In India, **Axis Bank** introduced an Iris Scan Authentication feature for Aadhaar-based transactions through its micro ATM tablets[15]. **ICICI Bank** introduced voice recognition for customers dialing into the bank's call center. Now, customers do not need to enter PIN and card number, instead using their voice as a password, which is authenticated based on speed, accent and pronunciation (unique to every individual)[16]. Additionally, **State Bank of India (SBI)** will soon be introducing multimodal biometric authentication for its mobile applications. The authentication would be done by recognition of fingerprint, face or voice[17].

8 THE LAB (KNOWLEDGE WORK FACTORY) – "Robotics in Banking with 4 RPA Use Case Examples", Chris Wilds, accessed December 2018 at https://thelabconsulting.com/robotics-in-banking-with-4-rpa-use-case-examples/

9 Signzy Website - https://signzy.com/

10 "ICICI Bank introduces 'Software Robotics' to power banking operations", September 8, 2016, accessed December 2018 at https://www.icicibank.com/aboutus/article.page?identifier=news-icici-bank-introduces-software-robotics-to-power-banking-operations-20160809103646464

11 The Economic Times – "How Indian startups gear up to take on the voice assistants of Apple, Amazon and Google", Shephali Bhatt, May 6, 2018, accessed December, 2018 at https://economictimes.indiatimes.com/small-biz/startups/features/how-indian-startups-gear-up-to-take-on-the-voice-assistants-of-apple-amazon-and-google/articleshow/64044409.cms

12 The Economic Times – "Evolution of voice assistants in banking - from simple Q&A to personalized advice", Jan 20, 2018, accessed December 2018 at https://economictimes.indiatimes.com/small-biz/startups/newsbuzz/evolution-of-voice-assistants-in-banking-from-simple-qa-to-personalized-advice/articleshow/62578778.cms

13 Ibid

14 FinTech Central – "Indian banking sector bets big on biometrics", Shraddha Singh, February 9, 2018, accessed December 2018 at http://www.fintechcentral.in/news/indian-banking-sector-bets-big-biometrics

15 Axis Bank Press Release – "Axis Bank introduces Iris Authentication over micro ATMs for Aadhaar-based transactions", August 09, 2018, accessed December 2018 at https://www.axisbank.com/docs/default-source/press-releases/press-release---axis-bank-introduces-iris-authentication-over-micro-atms.pdf?sfvrsn=7277b455_0

16 "ICICI Bank introduces voice recognition for biometric authentication", May 25, 2015, accessed December 2018 at https://www.icicibank.com/aboutus/article.page?identifier=news-icici-bank-introduces-voice-recognition-for-biometric-authentication-20152505124050634

17 The Times of India – "SBI to have multiple modes of biometric authentication for apps", Mayur Shetty, August 23, 2018, accessed December 2018 at https://timesofindia.indiatimes.com/business/india-business/sbi-to-have-multiple-modes-of-biometric-authentication-for-apps/articleshow/65511111.cms

Acquiring analytics-driven Deep Customer Insights

Banks are deriving meaningful customer insights using AI.

Chatbots, conversational interfaces embedded in a messaging platform, can be used to initiate tasks and provide information. Chatbots use NLP to understand typed text containing multiple permutations and match inquiries to decision trees. Basic chatbots provide limited sets of answers to a limited range of inputs. More sophisticated ones deconstruct customer questions to detect the intent behind the question. This is done via NLP, NLG and behavioral analytics with sentiment analysis.

Kotak Mahindra Bank, which launched the Indian banking sector's first AI-powered chatbot, has incorporated chatbot "Keya" into its phone-banking helpline to improve its interactive voice response (IVR) system[18]. **digibank** is India's first mobile bank that is staffed by chatbots providing real-time solutions to banking-related issues. It employs a trained AI platform, called KAI (a product of New York start-up Kasisto)[19]. To enable smooth e-commerce and banking transactions, **HDFC Bank** partnered with **Niki.ai** to launch "OnChat," a conversational chatbot that is available on Facebook messenger and can help HFDC customers and non-customers alike recharge cell phones, book a taxi or pay utility bills[20].

AI algorithms can utilize cognitive engagement solutions to anticipate customer needs and demands and provide suggestions. The technology behind this *personalized engagement* observes data sources like digital profiles, transaction history and behavior aspects to build models that generate actionable insights. Products and services can then be mapped to customers, thereby facilitating the delivery of personalized advice.

For example, the startup **YayPay**[21] uses machine learning to predict customer behavior by examining their customers' previous payments habits and behaviors.

Banks are also using *smart wallets*, mobile wallet apps that allow booking of bus tickets, taxis, events, movies, utility bill payments and more. The app tracks user actions and applies AI to provide personalized notifications for deeper engagement.

HDFC PayZapp is one of the leading online wallets in India, allowing for one-click payments. Users need to connect a debit or credit card once to the wallet before being able to use it for comparing flight and hotel tickets, buying music or paying bills[22].

Finally, banks may be able to employ *Emotion AI* in the near future. This technology enables machines to detect human emotions with advanced facial and voice recognition technologies.

Fulfilling Data-Driven Compliance

AI technology can be used in *Fraud Detection and Risk Management.* AI tools can proactively monitor and prevent fraud, money laundering and malpractice, as well as detect potential risks. Firms analyze an individual's spending data and behavior to determine patterns, enabling them to identify irregular transactions.

National Stock Exchange of India Ltd (NSE) has identified benefits of using machine learning to augment existing algorithmic trading activities[23]. The technology's enhanced ability to identify market patterns and automate low complexity tasks is significant to NSE's goal of trading risk minimization. **The Bombay Stock Exchange (BSE)** has been using AI-assisted solutions for rumor detection since 2016 as a means of detecting risk and reducing information asymmetry[24].

Globally, **Microsoft** and **MasterCard** are teaming up to create a digital identity solution to help protect consumers across the shopping, investment and travel industries[25].

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18 Kotak Annual Report 2017-18 - https://www.kotak.com/content/dam/Kotak/investor-relation/Financial-Result/Annual-Reports/FY-2018/kotak-mahindra-bank/Kotak_Mahindra_Bank_Limited_FY18.pdf

19 "Banking without branches, DBS digibank India gains 1m customers in a year", June 8, 2017, accessed December 2018 at https://www.dbs.com/innovation/dbs-innovates/banking-without-branches-dbs-digibank-india-gains-1m-customers-in-a-year.html

20 The Economic Times – "HDFC Bank's OnChat records 160% month-on-month growth in transactions", PTI, September 20, 2017, accessed December 2018 at https://economictimes.indiatimes.com/industry/banking/finance/banking/hdfc-banks-onchat-records-160-month-on-month-growth-in-transactions/articleshow/60765858.cms

21 YayPay Website - https://www.yaypay.com/why-yaypay-receivables-management-system

22 HDFC Bank Website - https://www.hdfcbank.com/htdocs/common/PayZapp/index.html

23 Livemint – "NSE bets big on AI, blockchain to mitigate algo-trading risks", Leslie D'Monte, March 26, 2018, accessed December 2018 at https://www.livemint.com/Money/yVXE5LBuDzLbHhoxOntvZI/NSE-bets-bigon-AI-blockchain-to-mitigate-algotrading-risk.html

24 BSE Media Release – "BSE implements artificial intelligence mechanism for rumour detection" November 21, 2016, accessed December 2018 at https://www.bseindia.com/markets/marketinfo/DispMediaRels.aspx?page=d3784583-0810-4bef-8754-087b60832bfa

25 Mastercard Press Release – "Mastercard, Microsoft Join Forces to Advance Digital Identity Innovations", December 3, 2018, accessed January 2019 at https://newsroom.mastercard.com/press-releases/mastercard-microsoft-join-forces-to-advance-digital-identity-innovations/

AI technology is also being used in *Transaction Analysis* to facilitate and secure transactions using voice recognition via banking applications. Additionally, AI personal assistants are being integrated with transactions to offer a more "unified form of transaction" that does not require extra verification steps.

Niki.ai is currently working with **HDFC Bank** to offer an AI-powered conversational interface that will streamline the transaction process[26].

AI can also help with *Compliance Monitoring* by continuously evaluating every single transaction in real-time. AI could examine lengthy documents and flag potential issues in seconds, something which would otherwise take many hours. It could also be trained to recognize unusual activity and generate certain actions if fail-safes are crossed.

AI technology can additionally be used to tie identity to a *Know Your Customer (KYC)/Anti-Money Laundering (AML) compliance process.* For example, image recognition of a passport may be used to compare an individual to an image in a store database.

Finally, AI can be used to assist *Complex Legal & Compliance Workflows.* Many vendors take a holistic compliance automation approach, tying together data collection at scale by using both structured and unstructured sources with checks against regulatory rules. Legal documents can be analyzed using machine learning to transform them into structured data and comparing the differences.

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26 Livemint – "Indian banks seek artificial intelligence", Vivina Vishwanathan, May 31, 2016, accessed December 2018 at https://www.livemint.com/Money/jQEQNXyfLkW1kY5FihFBHM/Indian-banks-seek-artificial-intelligence.html

3. Intended Benefits and Challenges for Stakeholders

Despite the advances over the last 60+ years since the term "AI" was first coined and identified, it is still a relatively new field and considered an emerging technology, especially in the banking sector. While it is difficult to classify all the benefits of AI in banking, there are immediate benefits that AI brings to stakeholders across the banking value chain.

Stakeholders and Benefits

Stakeholders include **customers, employees, management, shareholders, and regulatory bodies and the Reserve Bank of India (RBI)**, who see benefits including reduced costs, increased revenues, better experiences, fraud prevention and risk management (Figure 3.1).

Figure 3.1: Stakeholders and Areas of Benefit

	Customers	Employees	Management	Shareholders	Regulatory Bodies & RBI
Reduced Costs	■		■	■	
Increased Revenues			■	■	
Better Experience	■	■			
Fraud Prevention & AML	■		■		■
Risk Management			■		■

For *customers,* AI delivers an **enhanced, personalized experience** achieved through the combined power of big data, advanced analytics and machine learning. AI systems can consume and process a large amount of data using advanced analytics. ML can then help the system learn customer behaviors and preferences, which can be translated into actionable insights for both bank employees and systems interacting with customers. Eventually, customers receive personalized offerings and interfaces. For example, AI could analyze a customer's account information and spending patterns to make a customized finance management recommendation. AI can also quickly resolve many customer inquiries, with both NLP and NLG technologies accelerating this process.

This improved experience deepens a customer's relationship with his or her bank and builds loyalty. Increasingly tech-savvy consumers take out their smartphones about 200 times a day,

creating "micro-moments" where important decisions are made[27]. Therefore, banks have a significant opportunity to engage and delight their customers by providing meaningful experiences that can become happy micro-moments.

Customers are also bound to receive an indirect benefit from AI and automation – **lowered costs.** Automation would not only eliminate the need for manual effort on mundane, repetitive tasks, but would also deliver a more efficient output, as AI systems would potentially be able to work around the clock. The savings on costly human resources and increase in output will decrease overall costs for banks, which will potentially pass on the savings to customers.

AI can also help customers avoid **fraudulent transactions.** The bank's use of AI and analytics can help it keep track of regular customer transactions. If a fraudulent transaction then pops up, the technology can easily flag it as suspicious activity and notify the customer.

27 Capgemini, TechnoVision 2018: The Impact of AI

Bank employees' benefits from AI are twofold. While it's true that AI systems can eliminate the need for human/manual work in repetitive, monotonous jobs such as resolving common customer problems, scanning documents or entering data, there will now be **new jobs** created to manage those systems. This is especially crucial in the data revolution that is currently underway. The sheer amount of data that is generated at high speeds will require AI for effective data management, processing, mining and warehousing. Highly skilled employees will be required to create, train, govern and maintain AI systems. In fact, a whopping 96% of Indian banking executives have indicated that AI is already creating new job roles within their organizations[28].

Bank Management teams are receiving numerous benefits from AI, including **reduced costs, increased revenues, better fraud prevention and AML, improved lending risk management, and better regulatory compliance.**

More than 84% of Indian banking executives have said that the most tangible benefit from AI was a reduction in **labor costs**. However, 90% of the executives also indicated that in the long-term, they expect most benefits to come from a workforce that is augmented with AI, not replaced by it[29].

As AI becomes more knowledgeable about customer preferences and behaviors, banks can also target marketing and sales efforts in a more personalized and meaningful way. As a result, banks will see **increased revenues**. In fact, more than 80% of Indian banking executives said their banks saw more than a 10% increase in the sales of traditional as well as new products and services, directly because of their AI initiatives[30].

Another benefit of AI for banks is **better fraud prevention and AML**. In the past, steps towards mitigating fraudulent or suspicious transactions have been reactive, not proactive, as most transactions have been completed before the bank noticed the suspicious activity. AI systems enable banks, in real-time, to identify the legitimacy of the transaction based on factors such as location, type, amount, nature, source and destination. Conversely, current AML measures use rule-based algorithms that can give false positives such as flagging or blocking a valid transaction because of a violation of the fixed rules. Approximately 84% of banking executives saw more than a 10% decrease in false positives after embedding AI into their fraud detection systems[31].

Non-performing assets (NPAs) are one of the biggest challenges currently facing the Indian banking industry. Existing background and credit check methods only consider a borrower's historical data, not his or her current habits. AI can improve **lending risk management** by scanning and evaluating a borrower's data from social media and other current sources, providing a more holistic view of the borrower's capability to pay back loans on time.

Due to the combined effect of decreased costs and increased revenue, as well as improved fraud and risk management, from implementing AI in existing banking systems, *shareholders* can expect to see **better returns.**

Finally, AI helps *governmental regulatory bodies and the RBI,* which sets regulation for Indian banks, see **increased, quicker regulatory compliance from banks**. Banks must track incoming regulatory changes from the RBI; NLP can help expedite this process by extracting the pertinent information from the changes and notifying the appropriate bank personnel. Advanced AI-based systems could potentially even implement the changes to ensure compliance. In fact, eight out of ten executives in a recent Capgemini Research Institute survey, titled "Turning AI into concrete value: the successful implementers' toolkit," revealed that their banks' AI initiatives lowered their compliance costs by more than 10% while helping them achieve greater legal and regulatory compliance[32].

AI Adoption Challenges

Though there are considerable business benefits from AI, some banks struggle to quickly develop and deploy AI solutions. Some of the main challenges for these banks occur around **data, operations, talent and regulations**[33].

Data – Easily the most important piece of the AI puzzle; the predictive capabilities of AI models are only as good as the breadth, depth and quality of data coming in. Approximately 78% of banking executives cited a lack of "right data" to implement the algorithms as one of the main challenges faced by their organizations when implementing AI initiatives[34]. A bank's trouble in accessing the right data is compounded by challenges such as

- FinTechs/Start-Ups commoditizing exclusive datasets
- Complexity of data management
- BigTechs, armed with vast data repositories, aiming to increase banking market share

28 Analysis based on Capgemini Research Institute Report, "Turning AI into concrete value: the successful implementers' toolkit, 2017"
29 Ibid
30 Ibid
31 Ibid
32 Ibid
33 World Economic Forum (WEF), The New Physics of Financial Services: Understanding how artificial intelligence is transforming the financial ecosystem, R. Jesse McWaters, Aug 2018
34 Analysis based on Capgemini Research Institute Report, "Turning AI into concrete value: the successful implementers' toolkit, 2017"

Operations – most AI use cases require integration into core business systems; plug and play implementations aren't enough. As a result, legacy systems must be overhauled. However, incumbent banks are hesitant to prioritize core technology enhancements because they don't provide immediate benefits. But banks must understand that band-aid solutions in an AI-powered world won't work. In addition to core system upgrades, banks must also update process maps that support human-machine interaction, create a solid infrastructure based on agile-cloud-microservices, and have an organizational structure redesign that can manage the change.

Talent – Approximately 75% of Indian banking executives believe that the shortage of appropriate talent is impeding AI implementation in their organization[35]. Many employees are lacking the skills and capabilities required, which can be exacerbated by narrow training structures, incompatible corporate cultures and ill-equipped leaders in top management. Banks stand to also see a talent drain of their employees to BigTechs that are swooping in to offer generous compensation packages and non-traditional roles to employees. Regulators are also facing a talent shortage and need skilled employees who can help spearhead a forward-facing view on AI. Interestingly, FinTechs and start-ups may be able to jump in and supply talent with "in-demand" capabilities to both incumbent banks and regulators.

Regulations – More than 78% of banking executives say that uncertain laws and regulations is a challenge in AI implementation, but regulators are constrained by a lack of resources and thus unable to keep pace with the emerging technology, leading to significant roadblocks in deployment of AI initiatives[36]. Notable challenges for banks include

- Complex regulatory frameworks
- Identity management

- Lack of a defined liability model
- Auditability of algorithm-driven AI solutions
- Delayed implementations due to fear of wrong steps in compliance
- The financial system with AI at its core vs. the underlying principles of consumer financial protection & fairness
- The complexities of cross-border deviations on data standards, privacy & frameworks may inspire rogue trading, capital adequacy risks and cyber-security threats.

Unintended Consequences for Society

It is possible that AI could create unexpected outcomes in society, including workforce disruption, ethics and discrimination issues, and systemic risk.

Well-developed plans must be created to effectively manage the future talent shift and transition vast portions of the human workforce through a "4th Industrial Revolution." Additionally, there must be better understanding of AI technology to detect and prevent the creation of models that could discriminate against or exclude marginalized groups and individuals. Finally, as AI takes on an increasingly critical role in day-to-day operations of financial systems, it poses new sources of systemic risk that have the potential to disrupt national and global economies, necessitating new controls and responses. Herd Risk includes the risk of contagion where market losses from a shared algorithm could compound, or model miscalibration errors may affect multiple institutions simultaneously. The increased level of interconnectedness in an AI ecosystem also brings additional opportunities for cyberattacks.

TeamLease Services, India's largest temp staffing company, has estimated that while some industrial jobs have been lost to robots, 'some industries foresee an additional 37% of the jobs that currently exist could be impacted in some way; not specifically banking, where the impact is much less.

For the employees whose roles are affected by AI, there is a perception that bots will replace them and take away their jobs. This anxiety was reflected in one of the surveys of Indian banking executives where more than 70% of them said they are facing challenges in adopting AI technologies due to employee concern over the impact of AI on job losses[37].

Nevertheless, organizations must adopt AI with the same pragmatism and fearlessness they have exhibited when implementing other technologies such as

API-driven Open Banking. While AI technologies are primed to transform the workforce, they will also create new opportunities across the banking value chain.

On the back-end, a highly-skilled workforce will be needed; while robots may be as good as, or better than 2.5 human workers, they still require a dedicated team of 5-7 technologists to develop, deploy and maintain. On the front-end in the foreseeable future, AI cannot replace those job functions that require uniquely human characteristics such as perception, empathy, the ability to reason, and creativity. By automating the more mundane/repetitive tasks, AI can free up employees, enabling them to focus on performing more value-added tasks requiring these human characteristics.

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35 Analysis based on Capgemini Research Institute Report, "Turning AI into concrete value: the successful implementers' toolkit, 2017"

36 Ibid

37 The Economic Times – "Rise of the machines: When bots take over the workplace", Shelly Singh, December 4, 2018, accessed January 2019 at
  https://economictimes.indiatimes.com/jobs/rise-of-the-machines-when-bots-take-over-the-workplace/articleshow/66930068.cms

4. The Way Forward for AI in Banking

Early adopters of AI in the banking industry are now starting to see the tangible benefits of this technology. This trend is bound to accelerate in the future, so banks that have been slow to respond simply cannot ignore AI anymore.
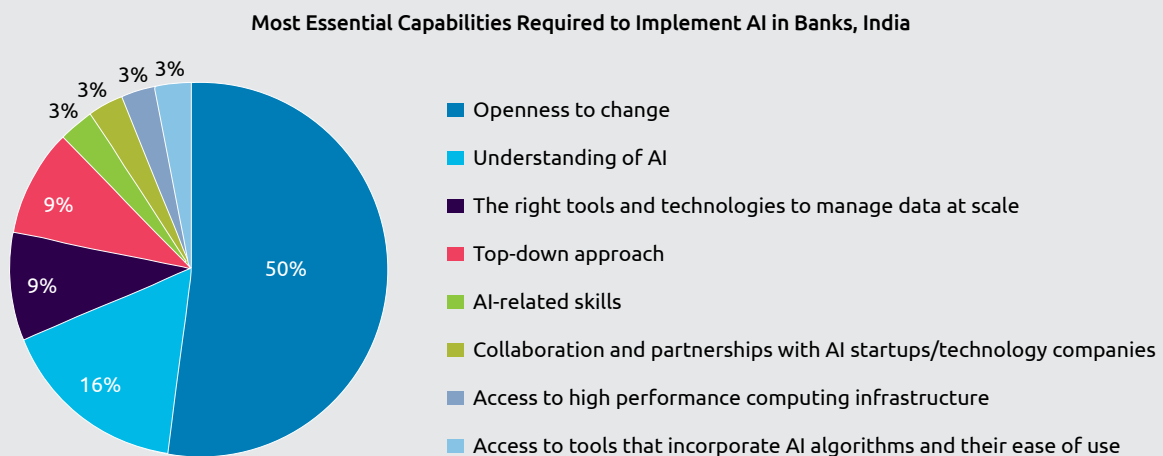
However, there are inherent challenges associated with AI that banks must deal with suitably. Currently, banking customers are used to the superior customer service offered by BigTechs and expect the same from their banks. Customers have little to no appetite for system outages, negative experiences and unsatisfactory service. Therefore, a poorly planned or implemented AI investment could be extremely damaging, and even counter-productive for banks.

Banks must have a calculated approach to AI that fits well within their overall IT strategy. Before an "AI Transform," where AI solutions are implemented on an enterprise-wide

level, banks must first consider the needs of all stakeholders. In addition, the bank needs to be very clear on why it is undertaking this transformation, as well as what it wants to achieve as the outcome.

In a survey (Figure 4.1) conducted across banks in India, executives responded that the most essential capability required to implement AI is to be open to change, followed by the need to understand AI. Interestingly, AI-related skills, access to high performance computing infrastructure and tools that incorporate AI algorithms were rated as much less essential, indicating that these are abilities that can be acquired if there is a strong willingness to change, along with an understanding of what is to be done.

Figure 4.1: Most Important Capabilities for a Successful AI Implementation

Most Essential Capabilities Required to Implement AI in Banks, India

- Openness to change
- Understanding of AI
- The right tools and technologies to manage data at scale
- Top-down approach
- AI-related skills
- Collaboration and partnerships with AI startups/technology companies
- Access to high performance computing infrastructure
- Access to tools that incorporate AI algorithms and their ease of use

Source: Analysis based on Capgemini Research Institute Report, "Turning AI into concrete value: the successful implementers' toolkit, 2017"
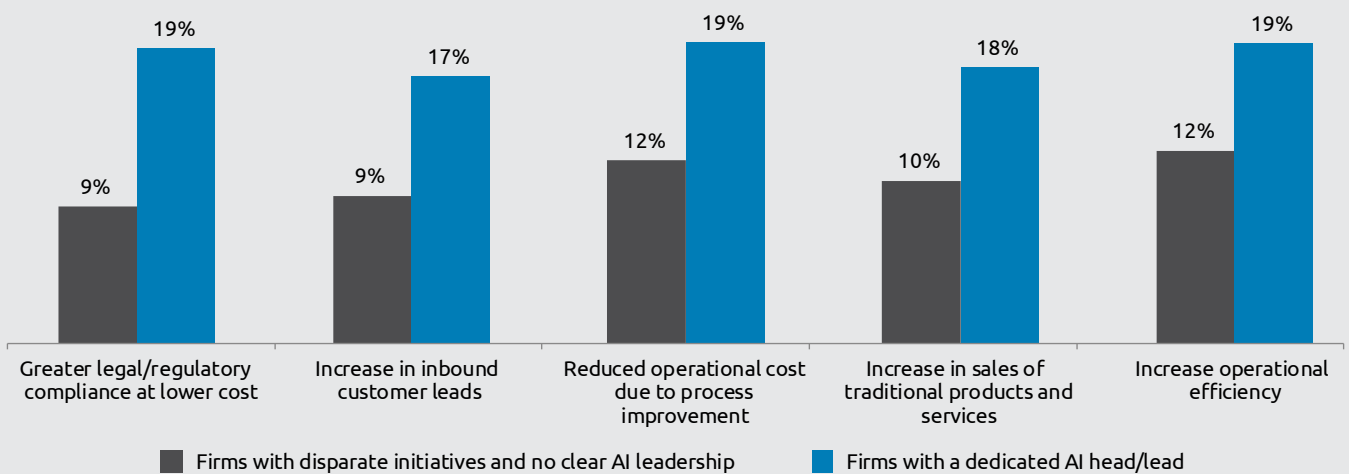
Key Factors for an "AI Transform"

Before undergoing an AI Transformation, banks must "AI Activate", or prepare the organization for the change, and take some key factors into consideration:

- **Leadership and Governance** – Banks that have a clear and established AI governance, with a functional AI leadership team, are more likely to reap the full benefits of any AI implementation. To ensure that banks realize the complete game-changing potential of AI, it is imperative that there are robust and mature data practices in place[38]. The team is essential to ensure that the key data required for a successful AI implementation is being collected the right way, the right ideas and use cases are being prioritized, and that the entire organization is open to the change and transformation that an AI program warrants. The AI program needs to have a designated leader who can leverage AI as a key enabler for the organization, setting an overall vision and instituting the right policies around data collection, data handling, and data governance. Capgemini research (Figure 4.2) shows that firms around

the world and across business sectors that had a dedicated AI lead outperformed those with no central AI leadership, where the various AI projects were running as standalone initiatives. In addition, banks must invest in building a team of AI specialists with the right skillsets, as well as ensure there is sufficient relevant data to train the AI systems.

- **Clear Prioritization of Use Cases** – Banks must prioritize use cases and implement the most critical ones that can provide high benefits with low implementation complexity. For banks that are just starting the AI journey, it may be best to start implementing use cases that may not have the highest benefits but can be easily implemented. Capgemini research shows that while many organizations have started tackling the toughest AI challenges (from the "Need to Do" segment in Figure 4.3), fewer firms are taking on the "Must Do" use cases that are low-hanging fruit. While the "Need to Do" use cases have the highest benefits, they are also the most difficult to implement. For banks that are just starting an AI journey, "quick wins" with "Must Do" use cases can give the team experience and confidence to move on more complex implementations.
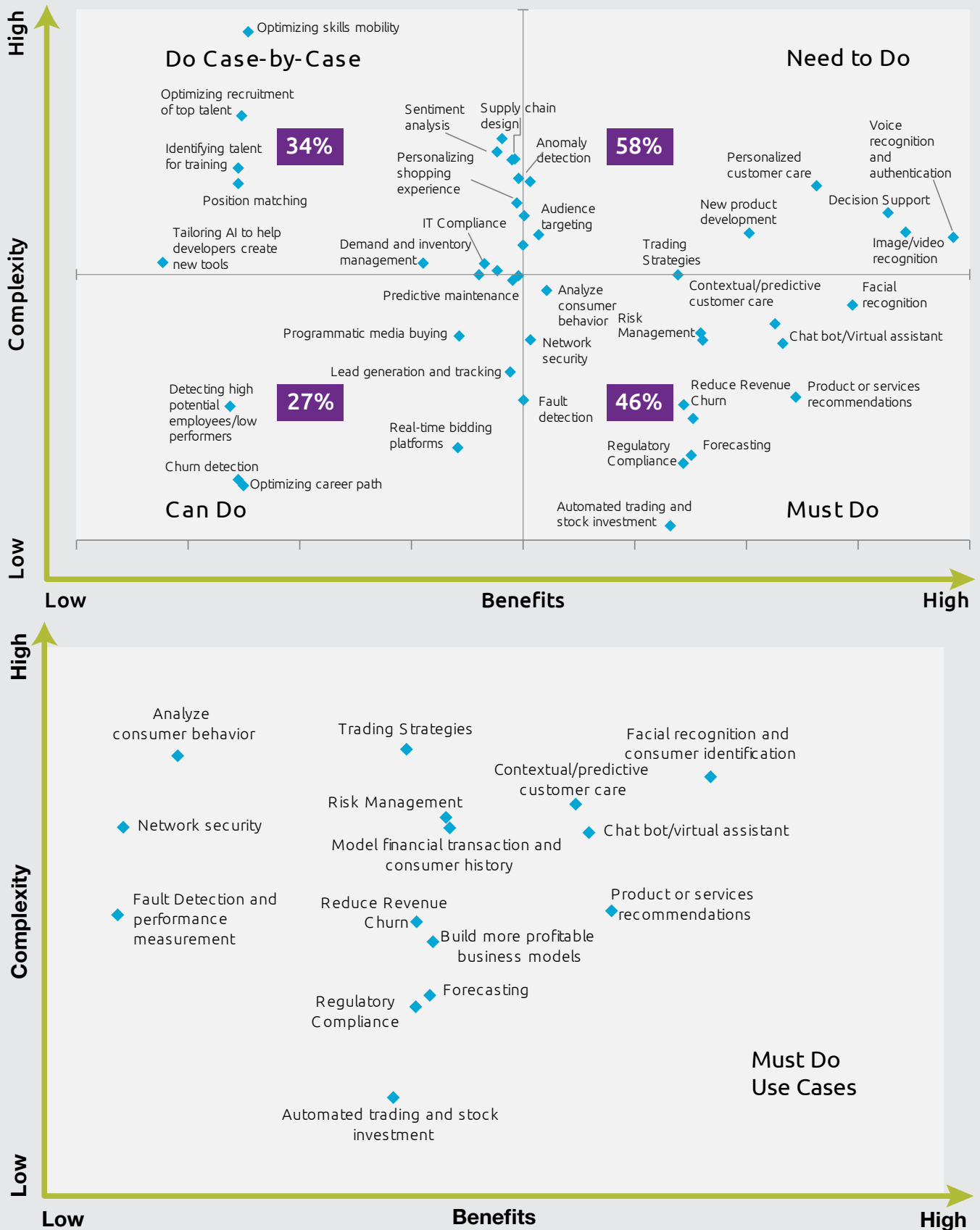
Figure 4.2: Relation of Dedicated AI Leadership with Implementation Benefits

	Greater legal/regulatory compliance at lower cost	Increase in inbound customer leads	Reduced operational cost due to process improvement	Increase in sales of traditional products and services	Increase operational efficiency
Firms with disparate initiatives and no clear AI leadership	9%	9%	12%	10%	12%
Firms with a dedicated AI head/lead	19%	17%	19%	18%	19%

Source: Analysis based on Capgemini Research Institute Report, "Turning AI into concrete value: the successful implementers' toolkit, 2017"

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38 The Economic Times – "Rise of the machines: When bots take over the workplace", Shelly Singh, December 4, 2018, accessed January 2019 at https://economictimes.indiatimes.com/jobs/rise-of-the-machines-when-bots-take-over-the-workplace/articleshow/66930068.cms

Figure 4.3: Distribution of AI Use Cases by Benefits and Complexity

Distribution of AI Use Cases by Benefits and Complexity chart:

Top chart — four quadrants:

Do Case-by-Case (34%):
- Optimizing skills mobility
- Optimizing recruitment of top talent
- Identifying talent for training
- Position matching
- Tailoring AI to help developers create new tools
- Sentiment analysis
- Personalizing shopping experience
- Demand and inventory management
- IT Compliance
- Supply chain design
- Anomaly detection
- Audience targeting

Need to Do (58%):
- Personalized customer care
- New product development
- Voice recognition and authentication
- Decision Support
- Image/video recognition
- Trading Strategies

Can Do (27%):
- Predictive maintenance
- Programmatic media buying
- Lead generation and tracking
- Detecting high potential employees/low performers
- Real-time bidding platforms
- Churn detection
- Optimizing career path

Must Do (46%):
- Analyze consumer behavior
- Network security
- Fault detection
- Contextual/predictive customer care
- Risk Management
- Facial recognition
- Chat bot/Virtual assistant
- Reduce Revenue Churn
- Product or services recommendations
- Regulatory Compliance
- Forecasting
- Automated trading and stock investment

Axes: Complexity (Low to High vertical), Benefits (Low to High horizontal)

Bottom chart — Must Do Use Cases:
- Analyze consumer behavior
- Trading Strategies
- Facial recognition and consumer identification
- Contextual/predictive customer care
- Network security
- Risk Management
- Model financial transaction and consumer history
- Chat bot/virtual assistant
- Fault Detection and performance measurement
- Reduce Revenue Churn
- Build more profitable business models
- Product or services recommendations
- Regulatory Compliance
- Forecasting
- Automated trading and stock investment

Axes: Complexity (Low to High vertical), Benefits (Low to High horizontal)

Source: 'Turning AI into concrete value: The successful implementers' toolkit' Capgemini Research Institute, 2017

When prioritizing use cases for AI, banks must not only consider the complexity and benefits of every use case, but also need to factor in which use cases are the most pertinent for their overall strategy and objectives.
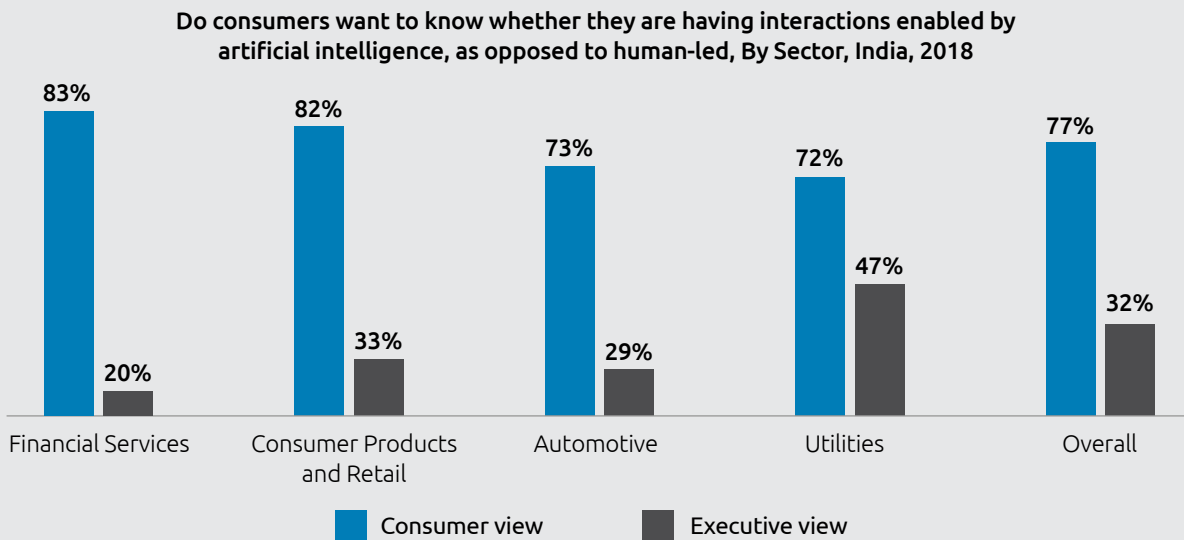
- **Customer Impact** – As banks create their AI strategies, they must consider not only how the technology will impact customers, but also how the customers perceive AI. Capgemini's recent research on how customers perceive AI found that they prefer interactions that are enabled by a combination of artificial and human intelligence. Additionally, approximately 83% of consumers in financial services want to be made aware that they are interacting with AI, compared to only 20% of executives who believe consumers want to know (Figure 4.4).

Indian customers indicate these are the significant benefits of AI-enabled technologies:

- 24/7 availability (67%)
- Faster resolution of requests (56%)
- Better privacy/ security of data (52%)

Finally, Indian consumers prefer human-like qualities to make their AI-based interactions more convincing. Approximately 85% of consumers want a human-like voice from their AI systems, 83% want a human-like intellect, and 82% of them want their AI system to have the ability to understand human emotions and respond to them[39].

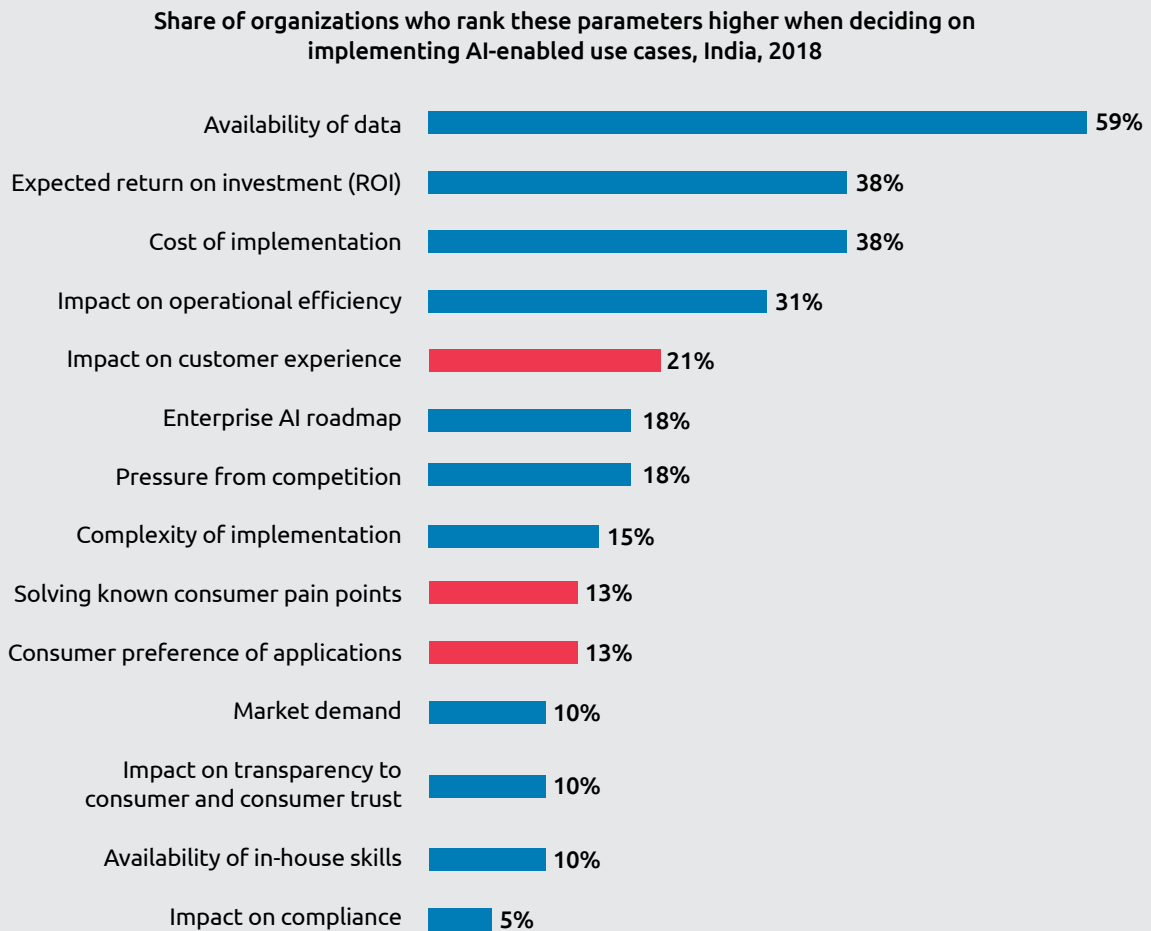**Figure 4.4: Consumers' and Executives' Views on Customer-AI Interactions**

Do consumers want to know whether they are having interactions enabled by artificial intelligence, as opposed to human-led, By Sector, India, 2018

	Consumer view	Executive view
Financial Services	83%	20%
Consumer Products and Retail	82%	33%
Automotive	73%	29%
Utilities	72%	47%
Overall	77%	32%

Source: 'The Secret to Winning Customers' Hearts With Artificial Intelligence: Add Human Intelligence' Capgemini Research Institute, 2018

Unfortunately, most banks in India are focusing primarily on data availability and their ROI, instead of the customer experience, when implementing use cases (Figure 4.5).

Only 21% of firms are considering the use cases that have an impact on customer experience, and 13% on use cases that solve known customer pain points. Going forward,

Figure 4.5: Indian Banks' AI Implementation Use-Case Priorities

Share of organizations who rank these parameters higher when deciding on implementing AI-enabled use cases, India, 2018

Parameter	Share
Availability of data	59%
Expected return on investment (ROI)	38%
Cost of implementation	38%
Impact on operational efficiency	31%
Impact on customer experience	21%
Enterprise AI roadmap	18%
Pressure from competition	18%
Complexity of implementation	15%
Solving known consumer pain points	13%
Consumer preference of applications	13%
Market demand	10%
Impact on transparency to consumer and consumer trust	10%
Availability of in-house skills	10%
Impact on compliance	5%

banks may want to focus on implementing use cases that positively impact customer experience. Capgemini research indicates that a positive AI-enabled experience will promote greater bank loyalty, with 84% of Indian consumers sharing their positive experiences. The research also indicated that consumers are likelier to pay more for a better experience, with 78% of Indian consumers indicating they would do so[40].

- **Employee Trust and Concerns** – While there have been many discussions around the impact of AI on human jobs, Capgemini research shows that globally, 82% of banks have had AI create new job roles in their organizations, while 72% have not seen any job loss due to AI at all[41]. Resistance to AI can also make banks less open to change,

which has slowed down AI implementation in Indian banks. Past research has found that the biggest roadblock to technology transformation is not technology, but cultural issues and the acceptance of change by stakeholders. It is critical that banks have an open line of communication with their employees and allay their fears. Bank leadership should involve employees at every step of this journey, so there is a greater buy-in from them as they get more comfortable with the upcoming change and realize that the future will require machines and humans to work together (but not one working at the expense of the other). Banks should also retrain their staff to prepare them for possible future roles.

40 Capgemini Research Institute's 'AI in CX' Consumers and Executive Survey, May 2018
41 Capgemini Research Institute's 'State of AI' survey, 2017

Conclusion

AI is a game changer in the banking industry.

For banks today, a successful AI transformation is fast evolving from being just a competitive differentiator into a critical and immediate need. Indian banks have a unique opportunity to leverage government identification and digital payment initiatives that utilize AI. By doing so, banks can maximize benefits by potentially reaching a larger audience.

In order to effectively undergo an AI transformation, next generation banks need to strategically embrace AI technology starting with use cases that will deliver immediate benefits but are not technically complex to implement.

With BigTechs setting the bar high from a customer experience perspective, banks must put the customer experience in the forefront of decision-making. Customer loyalty and revenue are increased when customers are delighted by their banking experience.

Banks must also take change management seriously within their organizations by communicating with all stakeholders and providing the tools and training necessary to seamlessly adapt to the change brought by AI.

By engaging professionals who are thoroughly able to analyze the end-to-end business process, banks can better determine what their longer-term AI state should be, based on their unique needs, culture, and ethos.

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