



Original Article

# Adoption of Gen-Ai in the Indian Banking Sector: Opportunities and Risks

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## Abstract

*The integration of Generative AI (Gen-AI) in the Indian banking sector is revolutionizing financial services by addressing operational inefficiencies and enhancing customer engagement. With applications such as AI-driven chatbots, automated document processing, and sophisticated fraud detection systems, banks have significantly improved service delivery while reducing costs. These technologies enable precise customer interactions, streamline workflows, and enhance risk management strategies. Looking ahead, Gen-AI holds immense potential for transformative advancements, including hyper-personalized banking experiences, predictive analytics for fraud prevention, and robust compliance mechanisms. These innovations can redefine banking standards, ensuring a seamless, secure, and customer-centric approach. However, the adoption of Gen-AI also raises critical concerns regarding data privacy, sovereignty, algorithmic bias, and cybersecurity threats. Addressing these challenges requires the development of stringent regulatory frameworks, ethical AI deployment, and proactive risk mitigation strategies. A collaborative approach involving regulators, financial institutions, and technology providers is essential to establish a secure and trustworthy AI ecosystem. Policymakers must ensure that AI-driven solutions align with compliance standards while promoting innovation. By striking a balance between technological advancement and ethical responsibility, Indian banks can leverage Gen-AI's full potential to foster an inclusive, resilient, and future-ready financial sector. This strategic integration of AI can drive financial inclusion, improve decision-making processes, and create a more dynamic and responsive banking landscape.*

**Keywords:** Artificial Intelligence, Cybersecurity, Data Governance, Digital Banking, Fraud Prevention, Gen-AI, Technological Advancement

## Introduction

The rapid advancement of technology is transforming industries globally and the banking sector is no exception. The use of Generative Artificial Intelligence (Gen-AI) has significantly increased its potential to revolutionize traditional banking services (Stanoevska, 2024). Gen-AI, capable of content generation, complex dataset analysis, and actionable insight capabilities offers a new paradigm of operational efficiency along with a more customized user experience and better decision-making in financial services. In the Indian banking landscape, where financial inclusion and digital transformation are critical priorities, the adoption of Gen-AI presents opportunities, challenges and risks. From automating customer service to advanced credit risk assessment and fraud detection, Gen-AI holds immense potential to address inefficiencies in banking sector. However, this transformative technology also brings us to some risks and challenges in terms of privacy, data usage, algorithmic discrimination, ethics, and regulatory compliance. Hence, its adoption needs to be conjured with a degree of restraint.

The adoption of new types of technologies, including AI/ML, requires careful regulation due to the impact they have on innovation and financial stability, something that the Reserve Bank of India also understands and recognizes the need hour (Dhake et al., 2024). AI has created a whole range of issues including ones around algorithmic transparency and ethical dilemmas. These issues are addressed by the framework of Responsible and Ethical Enablement of AI, while ensuring that financial institutions adequately use Gen-AI. The paper looks into opportunities and risks of using Gen-AI in the Indian banking industry, based on the findings of the RBI "Report on Trend and Progress of Banking in India 2023 – 24" (Reserve Bank of India, 2024). It assesses the degree of value that Gen-AI can add in terms of efficiency, financial outreach, and emerging issues with accentuation on the scarcity of risk-averse regulatory sets up.

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Understanding this relevant nexus of regulation, technology, and finance, this research gives holistic insight into the future of Gen-AI in Indian banking.

### Objectives

1. To assess the current adoption trends of Gen-AI in Indian banking.
2. To identify opportunities and challenges in the adoption of Gen-AI.
3. To analyse the perceived risks by regulated entities (REs) in the use of Gen-AI.

### Method and Materials

This research is based on a comprehensive analysis of data derived from the Reserve Bank's survey conducted in October 2024, as published in the *Report on Trend and Progress of Banking in India 2023-24*. The survey allowed regulated entities (REs) to select multiple risks, providing a detailed understanding of their perspectives on Gen-AI adoption. Key metrics from the survey, such as the adoption rates of various approaches, perceived risks, and specific concerns, were thoroughly examined. The research uses secondary data sources, including policy documents (Govt. Authorised), industry reports (Banking), and academic research were also reviewed for better understanding of subject and to provide a broader context.

The paper includes both qualitative and quantitative methodologies. Quantitative insights were derived from the survey data, focusing on statistical trends like percentages of REs identifying specific concerns. Qualitative analysis was conducted to interpret REs' feedback on risks, governance challenges, and service provider-related issues. By integrating these methods, the research offers a well-rounded evaluation of Gen-AI's impact on Indian banking and provides evidence-based recommendations for its effective and secure adoption.

### Generative Ai: Concept and Relevance to Indian Banking Sector

Generative Artificial Intelligence (Gen-AI) has emerged as a transformative tool with the potential to revolutionize the global business ecosystem (Scappaticci, 2023). In simple words a higher level of intelligence, Gen-AI uses complex learning models such as Generative Adversarial Networks (GANs) and adaptive models to generate, understand, and simulate decision-making scenarios for data. These resources are enabling banks to streamline processes, improve customer experience, and develop new financial services. In India, where banks serve a diverse population with varying levels of financial literacy and access, Gen-AI has the potential to connect different services, improve performance-driven tasks, and drive greater financial inclusion.

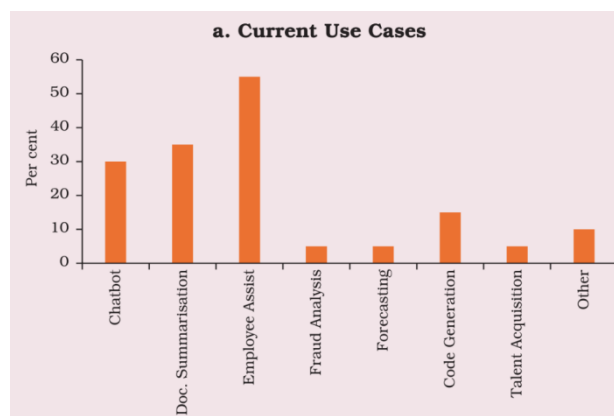
The recent studies showcase the evolution of Gen-AI has been driven by its ability to address complex challenges while offering scalable solutions. Unlike traditional AI systems that follow predefined rules, Gen-AI models can learn from vast amounts of data and automate specific tasks. This shift is making Gen-AI the foundation of digital transformation across all sectors, especially Indian banking sector (Sahoo & Dutta, 2024). Indian banks operate in a well-regulated and well-controlled environment and are now exploring how they can incorporate this technology into their operations to meet customer needs and manage technical resources.

#### A. Current Use Cases of Generative AI in Banking

The application of Gen-AI in Indian banking is still developing but has already achieved significant results in key areas. Financial institutions are unlocking responsiveness and business agility by using Gen-AI to eliminate inefficiencies, enhance customer satisfaction, enhanced decision-making and create a dynamic banking ecosystem (Dubey et al., 2024).

In customer service, Gen-AI is changing the way we interact by leveraging the power of intelligent chatbots and virtual assistants. These AI-powered solutions provide real-time support for queries ranging from financial information to loan applications, using Natural Language Processing (NLP) technology to simulate human interactions (Botunac, Parlov, & Bosna, 2024). According to a survey conducted by the Reserve Bank in October 2024, chatbot deployments in Indian banks will account for nearly 30% of AI users, this is improving response times and user engagement. Leading Indian banks like HDFC Bank and ICICI Bank have started leveraging virtual assistants to improve their customer support and enhance user experience.

**Table: 1. Current Use Cases of Gen-AI in Banking**



(Source: Report on Trend and Progress of Banking in India 2023-24)

Another critical application is document processing and summarization. Gen-AI has automated traditionally manual processes like loan application reviews and KYC verification. According to the same study, this application accounts for

approximately 35% of AI applications in this field of documentation. Gen-AI reduces processing time and increases accuracy by extracting, organizing and analysing information from scanned documents, thus improving customer experience and efficiency. Employee assistance tools powered by Gen-AI have also gained traction, with adoption rates exceeding 50%. These systems provide employees with on-demand insights, process recommendations, and real-time support, enabling staff to focus on strategic tasks rather than routine administrative work. This has not only enhanced workforce productivity but also improved decision-making across banking operations.

Fraud analysis and predictive forecasting each account for approximately 5% of current AI use cases in Indian banking. Gen-AI models analyse massive datasets to detect anomalies and flag suspicious activities in real time. Simultaneously, predictive models forecast customer behaviour, market trends, and cash flow requirements, allowing banks to anticipate needs and mitigate risks effectively (Cudia & Legaspi, 2024). These tools contribute significantly to safeguarding operations and reinforcing customer trust.

## B. Potential Use Cases of Generative AI in Banking

While current applications of Gen-AI are transforming banking operations, its future potential is even more compelling. The India Banking Trends and Progress Report 2023-24 highlights the Reserve Bank of India's focus on emerging technologies, highlighting opportunities for using AI to solve systemic problems and drive innovation across the sector, and the implications of easy access to increased financial resources.

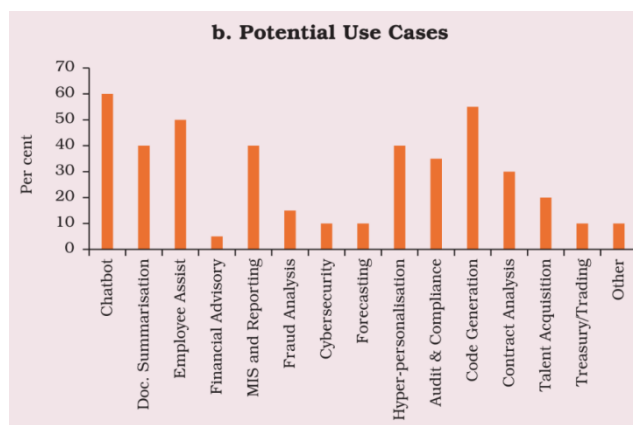
AI-powered tools capable of operating in regional languages can simplify complex financial processes, making them more accessible to rural and semi-urban populations. Automated loan disbursement platforms, such as those piloted under the Unified Lending Interface (ULI), could extend credit to small businesses and farmers more efficiently. In future projections, chatbot utilization is expected to grow to nearly 60% as banks increasingly rely on conversational AI to engage underserved communities.

Document processing and summarization will remain vital, with future adoption expected to reach 40%. Enhanced automation in this area will streamline workflows further, enabling faster decision-making and better compliance with regulatory requirements (Karangara, 2023). Gen-AI's role in creating smarter document management systems will be pivotal in handling the growing complexity of banking operations.

Fraud prevention mechanisms will see significant growth, with adoption rates projected to rise close to 20%. Gen-AI will enable banks to simulate sophisticated fraud scenarios, train detection models, and proactively identify vulnerabilities. This advancement will be crucial in combating increasingly complex fraud attempts as digital banking continues to expand.

Hyper-personalization, a growing focus area, is projected to account for 40% of future AI applications. Virtual financial advisors powered by AI could analyse individual profiles and recommend tailored solutions, such as savings strategies, retirement plans, or tax optimization techniques. These personalized interactions will foster trust and strengthen customer relationships, positioning banks as partners in financial well-being (Porancea-Răulea, 2024)

**Table: 2. Potential Use Cases of Gene-AI in Banking**



(Source: Report on Trend and Progress of Banking in India 2023-24)

Audit and compliance are expected to see increased use of AI, with adoption expected to exceed 30%. The Gen-AI system will automatically generate management information, identify compliance risks, and ensure compliance with changing procedures. These developments will reduce the burden on the compliance team while also increasing accuracy and efficiency (Al-Shabandar et al., 2019).

Code generation and smart contract analysis are emerging as critical areas for future AI adoption, with projected rates close to 50% and 30%, respectively. Gen-AI can create automated workflows for blockchain-based business reconciliation, reducing the need for human intervention and errors. Similarly, AI systems can analyse contract terms to identify risks and opportunities, simplifying complex tasks such as financial transactions and cross-border payments.

Strengthening cybersecurity frameworks will remain a top priority as digital adoption accelerates. Gen-AI systems can detect vulnerabilities, develop defensive strategies, and monitor networks in real time to prevent data breaches. These resources are vital to maintaining customer trust and preventing fraudulent financial information (Bhatnagar & Rajesh, 2024).

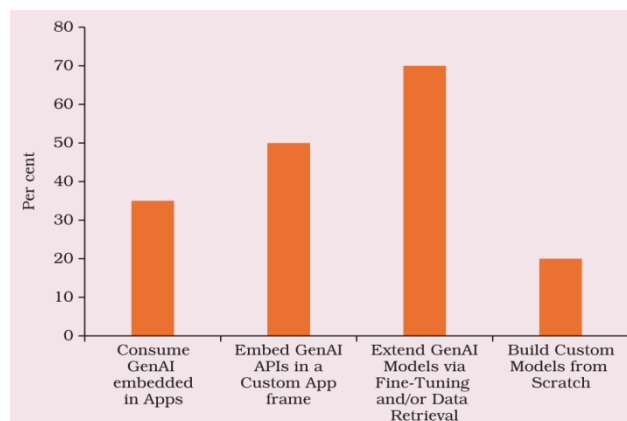
Ethical considerations will be central to the broader adoption of Gen-AI in banking. Transparent algorithms, strong privacy protections, and regular reviews are necessary to reduce the risk of bias and ensure compliance with regulatory standards. Establishing clear ethical guidelines will enable banks to reap the benefits of AI while maintaining public trust.

Gen-AI has begun reshaping the corporate landscape in India by increasing efficiency, reducing costs, and improving customer experience (Celestin & Vanitha, 2021). Its future applications are expected to bring new innovations, particularly in areas such as financial accounting, risk management, and security. But realizing this potential requires a balance that prioritizes ethical behaviour, strong governance, and stakeholder engagement.

### Approaches for Adopting Generative AI

The adoption of Generative AI in the Indian banking sector has followed varied approaches based on the specific needs and capabilities of financial institutions. According to a survey conducted by the Reserve Bank in October 2024, regulated entities (REs) were allowed to choose more than one approach for adopting Gen-AI, reflecting the diverse strategies in use.

**Table: 3. Approaches for Adopting Gen-AI**



(Source: Report on Trend and Progress of Banking in India 2023-24)

Close to 35% of REs reported consuming Gen-AI embedded in third-party applications, allowing them to leverage ready-made solutions without significant customization. Meanwhile, 50% of REs preferred embedding Gen-AI APIs within a custom application framework to retain greater control over functionality and integration with existing systems. The most popular approach, chosen by nearly 70% of REs, involved extending pre-trained Gen-AI models through fine-tuning or data retrieval mechanisms, enabling banks to tailor AI capabilities to their unique operational needs. Additionally, more than 15% of REs indicated that they are building custom Gen-AI models from scratch, a strategy requiring substantial resources but offering unparalleled customization and competitive advantage.

Further insights suggest that these strategies are often determined by the size, technological maturity, and financial resources of the institutions. Smaller banks and non-banking financial companies (NBFCs) tend to rely on third-party Gen-AI solutions due to their cost-effectiveness and ease of deployment (Siang & Megargel, 2024). Conversely, larger institutions with robust IT infrastructures often choose to embed APIs or fine-tune existing models, enabling greater customization and scalability. Building models from scratch, while resource-intensive, is typically undertaken by market leaders aiming to achieve unique capabilities or gain a competitive edge in niche areas like hyper-personalization or advanced fraud prevention.

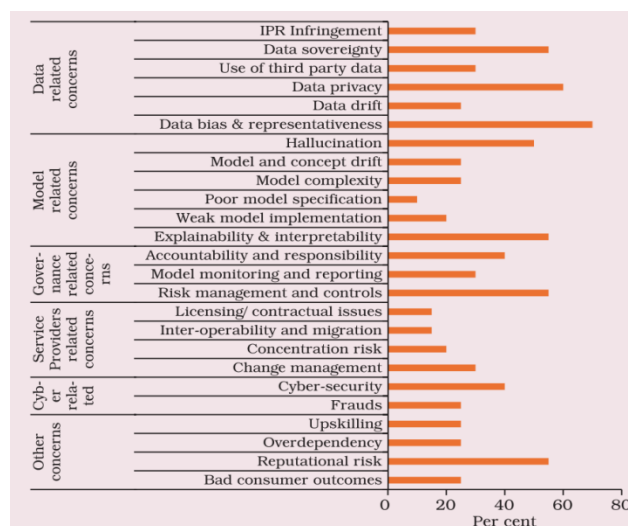
### Risks Perceived By Regulated Entities (REs):

The adoption of Gen-AI by regulators has presented a number of challenges, particularly around data, models, governance, service providers, and cybersecurity. These concerns highlight the need for effective risk management as organizations grapple with the complexities of AI implementations.

Data-related concerns are among the most critical challenges highlighted by REs. Issues such as Intellectual Property Rights (IPR) infringement, data sovereignty, and reliance on third-party data without clear ownership pose significant risks. According to a survey conducted by the Reserve Bank 2024, more than 40% of REs cited data sovereignty and privacy as major concerns. Furthermore, over 65% of respondents indicated that data bias and lack of representativeness are critical challenges, as these issues can lead to flawed decision-making and discriminatory outcomes.

Model-related challenges also feature prominently. Despite their potential, AI models face issues such as auditory processing, where the generated model is inaccurate or irrelevant (Torrie & Payette, 2023). Model and strategy drift over time reduces accuracy, requiring constant adjustments and retraining. Nearly 60% of REs report that explanation and interpretation are a major concern due to the potential impact on understanding or integrating AI-enabled insights into existing processes. These risks are exacerbated by the complexity and inefficiency of implementing AI models, leading to errors.

Governance-related concerns highlight the importance of accountability and oversight in AI-driven decisions. The survey reveals that nearly 60% of renewable energy companies see risk management and governance as their top challenge. Establishing good governance is essential, as poor monitoring and reporting processes can undermine trust in AI systems. Without clear responsibilities, organizations will struggle to resolve errors or comply with regulatory requirements.

**Table: 4. Risks Perceived by Regulated Entities (REs)**

(Source: Report on Trend and Progress of Banking in India 2023-24)

Cybersecurity concerns remain paramount as digital adoption increases. More than 40% of REs cited cybersecurity as a major concern, emphasizing the need for robust measures to protect sensitive financial data. AI systems, while enhancing efficiency, also introduce new attack vectors, making institutions vulnerable to cyber threats and fraud (Nuthalapati, 2023). Ensuring robust cybersecurity measures is essential to maintain customer trust and safeguard operations.

Risk is also a major concern, with over 50% of renewables identifying it as a major concern. AI errors, ethical lapses, or misuse of data can damage a company's reputation, lead to customer dissatisfaction, and regulatory oversight. Poor customer outcomes resulting from poor implementation of AI systems can further undermine trust and discourage adoption of new solutions.

To leverage the benefits and mitigate the challenges of Gen-AI, financial institutions must also invest in upskilling their workforce and developing robust processes. This includes facilitating collaboration with technology providers to ensure seamless integration and creating a framework for ongoing review to address ongoing issues (Krishnan, 2025). Fortunes change. By combining technology with attention to detail, banks can achieve innovation.

## Conclusion

The adoption of Gen-AI is an unprecedented opportunity to increase efficiency, personalize experiences, and improve financial accounting. While existing applications such as chatbots, data processing, and fraud detection have transformed day-to-day operations, the industry is expected to reach even greater heights in the future. This can be achieved through hyper-personalization, advanced fraud protection, and compliance. The ability to transform complex processes and provide rapid insights makes Gen-AI a key enabler of digital transformation in the rapidly changing financial landscape.

Concerns around data governance, privacy, and transparency underscore the need for strong data governance. Emerging issues such as model shift and conceptual drift are increasing the importance of transparency and convergence in AI systems. Additionally, governance challenges and cybersecurity vulnerabilities highlight the necessity of implementing stringent risk management and control mechanisms. Addressing these challenges will require a collaborative approach involving regulators, financial institutions, and technology providers to create a secure and trustworthy AI ecosystem.

The diverse strategies adopted by regulated entities (from embedding Gen-AI APIs to building custom models) demonstrate the flexibility and scalability of this technology. However, long-term success requires maintaining high morale and adhering to governance procedures. Investing in advanced research, technology development, and collaboration will play a key role in unlocking the potential of Gen-AI.

Address system inefficiencies, improve decision-making, and deliver superior value to customers. By balancing innovation with strong governance and good practices, Indian businesses can leverage these revolutionary tools while protecting their integrity, business, and reputation. As organizations grapple with the complexities of AI applications, the goal should be to create a sustainable, inclusive, and reliable financial ecosystem that aligns with business growth and technology development.

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**Conflicts of interest**

There are no conflicts of interest.

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