

## IMPACT OF ARTIFICIAL INTELLIGENCE (AI) ON BANKING SECTOR

**Dr. Rajkuvar S. Gajare**

*Associate Professor, Smt. P. K. Kotecha Mahila Mahavidyalaya, Bhusawal.*

*Email: [rajkuvarsgajare@gmail.com](mailto:rajkuvarsgajare@gmail.com)*

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### Abstract

Artificial Intelligence (AI) refers to computer systems capable of performing complex tasks that historically only humans could do, such as reasoning, making decisions or solving problems. AI is an increasingly important technology in the banking sector. It is being used to power both internal operations and customer-facing applications. As a result, banks are improving a wide range of functions across the front, middle and back office including customer service, fraud detection, wealth management and regulatory compliance. Artificial Intelligence (AI) is revolutionizing the banking industry by enhancing operational efficiency, improving customer experiences and supporting risk management. This paper explores the multifaceted applications of AI in banking including Chatbots, smart wallets, Robo advice, Cyber security and Credit scoring. It also examines the current status of AI adoption, future prospects and the challenges faced by financial institutions in integrating AI technologies. The paper aims to provide a comprehensive understanding of AI's impact on the banking industry and offers insights into how banks can navigate the complexities of AI implementation to achieve sustainable growth and innovation.

**Keywords:** Artificial Intelligence, Digital Transformation, AI Applications.

► *Corresponding Author: Dr. Rajkuvar S. Gajare*

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### Objectives of the Study

- 1) To study the use of artificial intelligence in banking sector.
- 2) To study the benefits and challenges associated with adoption of AI in banking.
- 3) To analyze the impact of AI on core banking functions.

### Methodology

The paper is based on secondary data. The study is not more descriptive in nature.

Information has been collected from various websites. The other research material / information available on internet have been studied.

### Introduction

The idea of machines and computers replicating human cognition and making informed decisions remained hypothetical for a considerable period. However, the appearance and presence of game-changing technological advancements in the form of artificial intelligence (AI), the Internet of Things (IoT), machine learning (ML), many others enable emboldened machines to act by analogy with humans. The progression of AI is permeating all industries and sectors, spanning manufacturing, retail, financial services, IT, service providers and hospitality and revolutionizing all facets of organizational operations. In particular, fast transformation and disruption across societies and industries are evident with the emergence of AI in commercial and financial

processes. With significant advancements in the 2020s, AI is optimizing the operations of multinational corporations like Facebook, Google, IBM and Microsoft leading the way through substantial investments. The financial services sector is no exception with significant integration of AI applications, particularly for automating processes. Compared to traditional financial institutions, today's firms are eager to invest heavily in data acquisition, storage and analytics, which is leading to an innovative, futuristic financial sector.

The idea of creating intelligent machines began in 1955 with a proposal for a research project at Dartmouth. While there is no single agreed-upon definition, AI is generally understood as the effort to move computers beyond simply mimicking human tasks toward achieving accurate intelligence and the ability to learn independently. Several studies highlight the advantages of AI over traditional methods in finance. For example, Fethi and Pasiouras showed that AI outperforms traditional techniques in assessing bank performance. Castelli et al proposed an AI system for predicting service quality. Similarly, Ghodselahi and Amirmadhi echoed their findings by observing improved credit-scoring performance with AI. It is also demonstrated that AI is able to learn complex financial relationships.

Artificial intelligence (AI) is the capability of computational systems to perform tasks typically associated with human intelligence, such as learning, reasoning, problem-solving, perception and decision-making. It is a field of research in computer science that develops and studies methods and software that enable machines to perceive their environment and use learning and intelligence to take actions that maximize their chances of achieving defined goals.

### **Applications of Artificial Intelligence**

High-profile applications of AI include:

- search engines (such as Google Search)
- generative and creative tools e.g. language models and AI art
- recommendation systems (offered by Netflix, YouTube or Amazon) driving internet traffic
- targeted advertising (AdSense, Facebook)
- virtual assistants (such as Siri or Alexa)
- autonomous vehicles (including drones, ADAS, Waymo and self-driving cars)
- automatic language translation (Microsoft Translator, Google Translate)
- facial recognition (Apple's FaceID or Microsoft's DeepFace and Google's FaceNet)
- image labelling (used by Facebook, Apple's Photos and TikTok).

However, many AI applications are not perceived as AI. A lot of cutting edge AI has filtered into general applications, often without being called AI because once something becomes useful enough and common enough it's not labeled AI anymore.

### **Artificial Intelligence in Banking**

AI in banking refers to the use of advanced algorithms, data models and machine learning techniques to automate time-consuming tasks, enhance decision-making accuracy, improve customer engagement and streamline complex operational workflows within financial institutions. It's the technological force behind faster approvals, sharper risk management and more tailored financial services.

Here are some of the most transformative AI technologies in use today:

- **Natural Language Processing (NLP)** powers customer service chatbots, voice assistants and other sentiment analysis machines to understand and respond to human language.
- **Machine Learning (ML)** algorithms detect patterns in massive datasets and adapt over time to improve accuracy and performance.
- **Optical Character Recognition (OCR)** translates printed or handwritten documents into machine-readable data.
- **Predictive Analytics** uses historical and real-time data to forecast future behaviours.

### **The Rise of AI in Banking**

Over the last decade, AI and machine learning in banking have gone through a remarkable transformation.

Historically, incumbent financial service providers have struggled with innovation. A McKinsey study found that large banks were 40% less productive than digital natives. Many emerging banking startups are pioneering artificial intelligence use cases, making it even more important that traditional banks catch up and innovate themselves.

Bankers have long used natural language processing (NLP) to parse the vast amounts of data they have internally or that they pull from third-party sources. They use data analytics tools to uncover insights and trends and make more informed decisions around key investments and wealth management.

The banking sector is increasingly relying on the advantages of AI technologies to remain competitive. Customers want seamless digital banking experiences apps that anticipate their needs and the ability to interact with people or virtual assistants depending on the complexity of their issue. Companies need to improve the user experience to keep those customers happy. Adopting and deploying generative AI solutions, coupled with effective data management is a key step toward that goal.

While AI is powerful on its own, combining it with automation unlocks even more potential. AI-powered automation combines the intelligence of AI with the reliability of automation. Traditional tools like Robotic Process Automation (RPA) have been valuable for streamlining repetitive tasks, but banks are now beginning to adopt agentic AI systems to handle more complex workflows.

An AI agent is capable of autonomous decision-making and can guide a loan application from start to finish. It can interact with the customers, verify documents, check creditworthiness against internal and external databases and flag compliance issues. It adapts to changing information and makes decisions in real time instead of just following preset rules, all with minimal human intervention.

### **Benefits of AI in Banking**

There are several key benefits for banks that embrace and deploy AI. The benefits of AI are not theoretical. They are measurable. They are real and they are already driving massive gains across the banking sector.

**1) Enhanced Application Programming Interfaces(APIs)** - Banking operations increasingly depend on the use of application programming interfaces (APIs) to enable customers to track their money on various applications. For example, banks must give API permission to third-party budgeting apps so customers can monitor multiple bank accounts. AI enhances API usage by enabling more security measures and automating repetitive tasks, making them more powerful.

**2) Faster Loan Processing & Approvals** - AI eliminates the bottlenecks of manual review by automating underwriting, cross-checking documents and verifying data instantly. What once took

days or even weeks, now happens in minutes. This not only improves customer satisfaction but gives banks a serious edge in the lending market.

**3) 24/7 Intelligent Customer Support** -AI-driven chatbots and virtual assistants are operational around the clock, offering immediate support across web, mobile and voice channels. They handle continuous tasks that don't require human representative, without making customers wait in line or on hold. The result is faster service, lower costs and higher retention.

**4) Enhanced Cybersecurity and Fraud Detection:** Cyber attackers increasingly use AI to create more sophisticated ways to defraud financial institutions. They can use AI-created audio to imitate customers, confusing customer service agents. They can use AI to make phishing emails look increasingly legitimate. As a result, those financial institutions can use AI algorithms to protect their employees from cybersecurity threats in real-time, while creating tools to help customers avoid the same tricks. AI models are trained to spot patterns humans can't. By analysing millions of transactions per second, these systems flag suspicious activity the moment it happens, stopping fraud before it spreads.

**5) Stronger Compliance Monitoring** -AI keeps banks one step ahead of regulators. By continuously scanning transactions, updating itself with policy changes and flagging anomalies in real-time, AI helps institutions stay compliant without drowning in paperwork. It also provides audit-ready reports that reduce compliance risk and speed up regulatory responses.

**6) Hyper-Personalized Banking** -AI tailors the banking experience for each user, curating product offers, generating financial advice and even predicting needs before they arise. By interpreting customer behaviour, spending patterns and goals, banks can turn generic service into one-to-one personalization at scale.

**7) More Intelligent Customer Tools:** The rise of generative AI and agentic AI powered by deep learning means that the investment and banking industries can deploy more sophisticated tools to streamline customer service. AI-powered chatbots and virtual assistants can enhance customer support, helping customers solve small problems on their own. AI can also power budgeting apps that help customers better manage their finances and save more money.

**8) Operational Cost Savings** -Through automation of high-volume, back-office tasks such as data entry and compliance checks, banks are reducing overhead and reallocating resources toward innovation and strategy. AI-driven workflows slash processing time and labour costs across departments.

**9) New Markets and Opportunities:** AI-driven predictive analytics and forecasting tools can identify new areas of growth, improve underwriting processes and better estimate which customers are a churn risk. For example, banks can analyse their customer's habits, such as how often they log in or deposit money and compare it to other data points to determine whether individual customers can be on the edge of cancelling their accounts.

These benefits are not just operational improvements for many institutions; they are bottom-line breakthroughs. Banks that receive these benefits are not just running leaner, they are becoming smarter, faster and more agile in a fiercely competitive market.

### **Challenges of AI in Banking**

Introducing AI in banking is not without risks and complications. An International Business Machine Corporation (IBM) and IBV study found that 55% of business and financial markets CEOs say the potential productivity gains from automation are so great, they must accept significant risk to stay competitive.

Here are common challenges that banks face when implementing AI. These are the speed barriers and roadblocks that slow down transformation issues that must be navigated smartly to unlock the full potential of AI-driven banking.

**1) Data Privacy & Security-** Embedding open AI tools and technologies into banking IT systems creates some security challenges because AI models are especially valuable targets for malicious people/Black Hat Hackers. Banks handle sensitive customer data and applying AI to that data must align with tight regulations like General Data Protection Regulation (GDPR) and Central Consumer Protection Authority (CCPA). Missteps can be costly in financially and in reputation. That's why banks need a holistic AI governance approach that effectively balances innovation and risk management. Implementing AI requires robust encryption, access controls and transparent data handling policies.

**2) Legal uncertainty related to operations-** Generative AI models need training on existing datasets to be effective. There are still some unsolved issues on whether analysing publicly available data, like news stories and explainer videos, constitutes copyright infringement. 77% of BFM CEOs say that inconsistent standards and regulations are inhibiting their ability to grow their business. One way to avoid this issue is to use AI models that have been trained on data that the bank owns, such as customer service interactions or its own proprietary research.

**3) Regulatory Complexity-** AI systems must not only deliver results but do so in a way that regulators can audit. That means explainability is critical. Banks must understand how models make decisions and be able to demonstrate fairness, accuracy and accountability.

**4) Bias in AI Models-** AI models are trained on human-created data, they can inherit some of the biases that influence humans. If an AI model is trained on biased or incomplete data, it can increase systemic inequalities, denying credit to underserved communities or unfairly flagging customers for fraud. Vigilant data governance and ethical model training are essential to avoid these pitfalls. Banks need to eliminate bias in how they market products and determine factors like creditworthiness, which historically has negatively affected certain demographics.

**5) Legacy System Integration -** Many banks are still running on decadesold infrastructure. Plugging cutting-edge AI into legacy cores is not just a challenge. It's often a horrible experience. Integration efforts require strategic planning, investment and often a broader digital transformation roadmap.

**6) Talent Gaps -** AI is not plug-and-play. It demands specialized skills in data science, engineering, ethics and governance. Unfortunately, the talent pool is tight. Banks that want to win in AI need to invest not only in technology but in recruiting and developing the people to drive it.

**7) Difficulties in controlling outcome accuracy:** Currently, AI models do not reason or understand their outputs. Instead, AI models detect patterns in the data, they are given and generate results. Therefore, the model cannot tell the human employee if the data is incorrect or inaccurate. This makes explainability critical, especially in a regulated industry like banking, where understanding how a model reached its decision is essential.

Addressing these challenges head-on is the only path forward. They are solvable with the right partners, the right infrastructure and the right mindset.

### **The Impact of AI in Banking**

The influence of AI in the financial sector is pervasive in our globalized environment and its significant effects can be witnessed across various regions worldwide. The best way to understand the impact of AI in the banking sector is to analyse the benefits that come with the technology. The review of them is as under.

**1) Finances**– We can see the financial impact of AI in the banking sector. It is quite multidimensional so we have to see from every possible perspective.

**A) Reduction in Customer Acquisition Cost** – Here we need to consider the use of AI in banking for the sake of customer onboarding. Artificial Intelligence along with biometric technology is utilised to accelerate the process and make it less strenuous, actively reducing abandonment rates. This way we can increase our marketing ROI by turning more leads into clients.

**B) Reduction in Operational Cost** – We need to consider operational costs. For example, Customer Support Agents, when aided by AI, they can navigate through your financial institution’s regulations efficiently, hence solving more queries. This result in a lower demand for customer support agents, which translates directly into savings.

**C) Intelligent Product Recommendations** – AI based solutions can provide our agents with smart sales suggestions based on customer data, hence boosting our sales and providing a steadier income stream to our organisation.

**D) Improvement in Decision-Making** – AI also impacts the financial side of the banking sector by improving overall decision-making. NLP models can improve fraud detection, consumer segmentation, data processing and security decreasing the cost required to do this manually.

**2) Security**–When discussing the impact of AI on banking, we must mention the way it affects security. Artificial intelligence does improve general data and financial security significantly.

**A) Fraud Detection**AI enhances fraud prevention. Machine learning models analyse transaction patterns in real time to detect anomalies, money laundering or identity theft, reducing false positives and improving security. AI, when trained on proper data, can spot anomalies indicating shady transactions or activities on the customer’s account, hence helping you detect them and prevent them more quickly.

**B) Protection the Data-** Artificial intelligence itself can help you protect your data. AI is capable of detecting potential cyber-attack attempts and alerting your teams about potential breaches. This way, you can react more quickly and gather customer trust, so important when it comes to acquiring new clients.

**3) Loan Decisions**– The impact of AI in banking sector may also be felt in other banking and financial sector, namely loans. The organizations specialising in them frequently use AI-ML systems to automate their loan decision-making process and make it more thorough by analysing additional data, such as transaction history or detecting fraud.

**4) Risk Management** –When it comes to decision-making, loans are not the only area impacted by AI in the banking sector. Another major shift can be observed in general risk management, where artificial intelligence is used to predict the unpredictable. For example, such systems are used to analyse currency fluctuations or even predict the consequences of natural disasters. This way, financial institutions can make better-informed decisions and mitigate risks related to external factors.

**5) Sustainability**–With the new EU regulations, banks are obliged to classify their transactions based on whether they are eco-friendly or not. This requires major data processing capabilities ones that AI has. With AI powered systems, it is possible for the banks to process the information acquired from their commercial customers and define which deals are indeed ‘green’ and which are not helping banks become more sustainable and remain compliant with the EU legislation.

**6) Customer Experience and Satisfaction**–AI also impact the general customer experience and satisfaction in the banking sector. Due to its data processing capabilities, AI reduces the time

required for most processes, leading to shorter turnaround times and happier customers. This refers to anything from customer service to loan decisions.

AI makes the processes easier and more convenient, especially for customers in the digital only or mobile only segments. Intelligent eKYC processes, videobots and widely accessible chat support which is powered with AI, help customers get their business done without leaving home, which is crucial for many younger consumers.

AI enables high level personalisation. This means providing customers with intelligent product recommendations, but also tailored content that is in line with their priorities and expectations, hence building loyalty and satisfaction. For example, AI Prompter can provide answers to customer's questions much faster than traditional ways of communication.

Thus, the impact of AI in the banking sector can be observed in almost every aspect of financial institution's operations.

### **The Future of AI in Banking Sector**

AI in banking is not slowing down. It's just getting warmed up. The global AI in banking market is projected to reach \$64.03 billion by 2030, up from \$3.88 billion in 2020.

The next wave of AI capabilities is about to reshape the industry all over again. These innovations will push the boundaries of automation, intelligence and personalization even further, driving competitive advantage for those ready to act now.

This is coming next in future –

**1) Generative AI for Customer Onboarding** - Imagine AI that doesn't just answer questions, it guides users through complex onboarding processes. From filling out forms to recommending the right products in real-time, generative AI will create interactive, conversational onboarding experiences that feel like talking to a private banker.

**2) Explainable AI (XAI)** - As regulators demand more transparency, XAI is on the rise. These models show not just what decision was made, but why. Whether it's approving a loan or flagging a transaction, XAI builds trust by making AI systems more interpretable, auditable and fair.

**3) AI-Driven ESG Risk Scoring** - Environmental, Social and Governance (ESG) factors are becoming critical in investment decisions. AI will analyse news, satellite images, company reports and more to deliver real-time ESG scores, helping banks manage reputational risk and align portfolios with sustainability goals.

**4) Autonomous Finance** - We're going toward AI that takes action without being told. These systems will automatically shift funds, adjust budgets or make investment changes on behalf of users, providing a 'set it and forget it' experience that constantly adapts to life changes, goals and spending patterns.

**5) Real-Time Fraud Defense** - The next evolution of fraud prevention is AI that doesn't just detect fraud, it stops it in its tracks. Streaming AI models will monitor transactions as they happen, flagging anomalies within milliseconds to lock down threats before damage is done.

### **Conclusion**

Finance is one of the fastest growing sectors where applied AI tools are being deployed from retail online banking to investment advice and insurance, where automated 'robot advisers' have been in use for some years. AI is profoundly transforming the Indian banking ecosystem by enhancing efficiency, security and customer experience. It plays a very important role in fraud detection, personalized banking and financial inclusion, especially in rural and semi-urban India.

In addition to this, the study focuses on the challenges faced by the banking sector by integration of Artificial intelligence such as regulatory complexity, data privacy & security, legal uncertainty related to operations, bias in AI models, technological restrictions and cyber security threats. By exploring into these aspects, the research aims to provide a comprehensive understanding of the impact of artificial intelligence in the banking sector, covering its capacities to innovative business ideas, change customer interaction and redesign competitive environment.

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