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Usage of Artificial Intelligence-Based Data-Driven Decision- Making In The Indian Banking Sector

¹Neetu, ²Dr. Anoop Pandey

¹Ph.D. Research Scholar, Hnb Garhwal University, Bgr Campus, Pauri Garhwal, Uttarakhand, Rscholarneetu@gmail.com

²Professor, Hnb Garhwal University, Bgr Campus, Pauri Garhwal, Uttarakhand, Anoop.Pandey2007@gmail.com

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ABSTRACT

While many Indian banks have adopted artificial intelligence in the workplace early, others are trying to adopt a fruit-hanging approach to adopting AI, understanding how banks maintain their data to make decisions based on artificial intelligence. The primary goal of this study was to explore why banks need to rely on Artificial Intelligence-based data-driven decision-making and how artificial intelligence-based data helps make decisions. Recently, many banks have adopted artificial intelligence (AI) for data-driven decision-making in India. A literature-based approach was chosen to synthesize existing knowledge, identify key themes, and evaluate the findings of AI adoption in banking decision-making. The findings revealed that Data-driven decision-making helps bankers work more efficiently and effectively. The traditional method takes too long to recognize fraud and make decisions, but now, AI-based algorithms work smartly and quickly. The most crucial element for AI to succeed and derive results is data. Rather than looking at AI from that perspective, banks first need to ask themselves what area they want to apply machine learning to. Banks should be aware of data and employee training.

Introduction

AI is not a new idea; over the past 70 years, computer scientists like Alan Turing, Marvin Minsky, and John McCarthy have built much of its theory and scientific base. (puja das, 2025), (Future Networks (FN) Division, 2020). Today, the area of computer science called artificial intelligence (AI) tries to make computers and systems that can think, learn, make choices, and understand common language. Tasks that typically require human intellect. (Holden & El-Bannany, 2004); (Nills, 2012). Artificial Intelligence is "when a machine mimics a human mind by thinking for itself."

Currently, big and small corporations are using AI technology. (Alhaddad, 2018). AI tools have been used to perform several activities across different fields and sectors. (Yomna Abdulla, 2021). Finance is one of the many businesses that use artificial intelligence (AI), which is developing quickly. Using artificial intelligence technology in the financial industry has fundamentally impacted business processes and the appearance of the financial sector. The application of AI in banking has opened up new possibilities, such as enhanced efficiency, greater accuracy, improved risk management, and data-driven decisions. Financial businesses now rely heavily on AI technology to enhance decision-making, extract valuable insights from data, and streamline procedures. (Tyagi et al., 2021), (Iftikhar et al., 2020); (Moiseeva & Schütze, 2020) and (Xu et al., 2021)

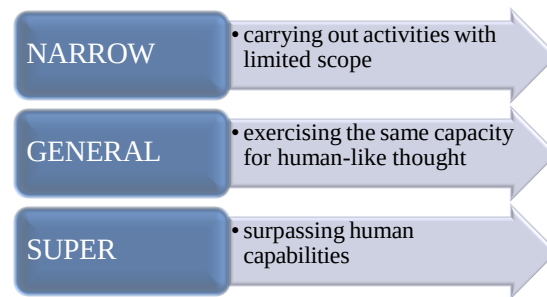


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Following World War II, the present effort to build artificial intelligence (AI) similar to that of humans began when it was discovered that electronic computers could manipulate symbols in addition to numerical values. This objective may be achieved without supposing that human and machine intelligence are identical. Weak AI is the term for this. (Fjelland, 2020). Many AI researchers have sought to develop strong AI or artificial intelligence that is theoretically equal to human intelligence. Weak AI is less ambitious than strong AI, making it less troublesome. (Fjelland, 2020).

India's recent policy initiatives, including the National Strategy for Artificial Intelligence, India AI Mission, AI for India 2.0, and Skill India AI Portal, aim to harness the potential of AI and related technologies while acknowledging the risks and challenges they present. (Goel et al., 2024). Furthermore, the Reserve Bank of India recognized the potential of AI/ML and similar technologies and advised banks to appropriately integrate them for ongoing due diligence and effective KYC/AML regulation monitoring (Goel et al., 2024). AI-driven decision making: The question arises when discussing artificial intelligence-based data-driven decision-making. What is AI-based data-driven decision-making? How can banks use artificial intelligence- based data to make decisions? According to a Harvard Business Review analysis by Eric Colson, many organizations have adopted a "data-driven" approach to operational decision-making. Data may help you make better decisions, but it needs to be appropriately processed. Many individuals believe that a processor is human. The phrase "data-driven" indicates that data is filtered and summarized for humans to process.

AI can quickly and accurately assess huge volumes of data using contemporary algorithms and machine learning approaches, making it a valuable tool for boosting data-driven decision-making.

This helps firms to discover significant insights and trends that human analysts may not recognize. AI may also automate monotonous processes, freeing decision-makers time for more strategic activity. AI enables firms to make data-driven choices with more certainty and efficiency.

According to Joe Atkinson, Global Chief AI Officer, Pwc US, "Technology is a powerful force, advancing every day, but Technology alone can't reinvent our business or change how we work. Meeting that challenge also requires smart, creative people of integrity who dive in and embrace advancing technologies, learning to apply AI in responsible and innovative ways."

"Although AI is not yet ready to replace people, it will enhance them by enabling them to engage in more valuable activities, releasing them from repetitive tasks, increasing their efficiency, and carrying out computations that would be physically impossible for one person to do alone. Artificial intelligence (AI) has recently made quick progress in language comprehension, object and sound recognition, and autonomous issue observation and resolution. (Kaya, 2019). There are many research studies discussing the role of Artificial Intelligence. However, a thorough study on AI-based data-driven decision-making in the Indian banking industry is lacking, and the primary query that comes up while discussing the use of AI-based data- driven decision-making is

RQ1. Why do banks need to rely on Artificial Intelligence-based data-driven decision-making? RQ2. How does artificial intelligence-based data help make decisions?

Literature Review

In the study by (Gorre, 2023), the Complex Proportionality Assessment (COPRAS) method is used to evaluate AI applications in banking. This system rates different AI-driven options for financial advice, fraud detection, and customer support based on cost reduction, efficiency, customer happiness, accuracy, and scalability. AI improves bank decision-making through real-time analysis of massive amounts of data. This leads to improved accuracy in credit scoring and loan approvals, better risk management, and the ability to personalize financial products. As a result, banks can make more equitable decisions, achieve greater operational efficiency, and increase customer satisfaction. Among the evaluated options, personalized financial advising received the highest rank. Real-time, improving credit scoring and loan approval accuracy, optimizing risk management, and personalizing financial products. This leads to more equitable decisions, operational efficiency, and increased customer satisfaction.

Implementation of AI applications: By storing, analyzing, and safeguarding consumer data using blockchain and artificial intelligence, the IBAI architecture improves the security of financial transactions. It significantly improves the accuracy of detecting suspicious behaviour and reduces the risk of data leakage. AI-driven algorithms used by banks analyze customer data quickly, allowing for unbiased decision-making. This capability not only enhances the detection of suspicious activities but also improves security in financial transactions and ensures data confidentiality, specifically included in the Framework for Integrated Blockchain and Artificial Intelligence (IBAI). The IBAI model achieves a suspicious behaviour detection accuracy of up to 98%, outperforming other models (Alenizi et al., 2024). AI plays a crucial role in decision-making within banks by improving transparency and traceability through Explainable Artificial Intelligence (XAI). This framework helps regulators and supervisors comprehend AI-driven decisions, ensuring compliance with the stringent regulations of the highly regulated finance sector (Weber et al., 2024).

FinTech's advanced data analysis and pattern recognition significantly aid in making well-informed decisions. Artificial intelligence (AI) enhances banks' decision-making through machine learning, predictive analytics, and natural language processing techniques. These technologies improve data analysis and pattern recognition, leading to more informed financial decisions. FinTech is an essential mediator between AI and economic decision-making, with machine learning enhancing informed decisions through its advanced analytical capabilities (Qatawneh et al., 2024). enthusiasm for AI's potential, seeing issues and opportunities that may be resolved by managerial, legal, and technical means. AI improves banking data collection and evaluation processes by acting as a cognitive assistant. AI technology is expected to play a bigger part in decision-making as it becomes more institutionalized, improving the accuracy and efficiency of financial decisions (BaniHani et al., 2024).

(Meena et al., 2024) Artificial Intelligence (AI) is vital in banks' financial decision-making. It enhances predictive modelling for risk assessment, improves client service delivery, and supports the development of emerging FinTech applications. This ultimately leads to more informed and efficient banking operations.

AI-enhanced decision-making: (Godolja, 2024) Data mining and machine learning facilitate analysis and provide the best credit options when data is collected online. At this point, robo-advisors are used to offer credit choices to clients. Conventional credit determination methods, which include submission to the advisory network, underwriting, and client communication, can take up to two weeks. Customers may, however, save time and feel more in control by receiving quick credit decisions with AI integration. Financial inclusion, profit maximization, and organizational risk management should all be balanced in decision-making processes.

AI enhances decision-making in banks by enabling improved risk management, increasing operational agility, and automating processes. While addressing issues like algorithmic bias and data privacy, it offers data-driven insights that propel essential advances in financial services. The effective use of AI and ML can revolutionize decision-making and risk management. Ethical AI practices demand fairness, transparency, and security (Gupta & Agarwal, n.d). AI is transforming financial decision-making in India by improving risk

assessment, portfolio optimization, fraud detection, and customer service. The integration of AI allows banks to process data more quickly and gain valuable insights, fundamentally changing traditional banking operations and encouraging innovation in the financial sector. With its ability to enhance financial decision-making processes, India's financial industry is poised for significant AI-driven advancements (Goswami, 2024). AI enhances decision-making in banks by streamlining risk assessments, enabling efficient credit scoring through machine learning, identifying suspicious activities, automating routine processes, and personalizing services. This ultimately leads to increased customer loyalty and satisfaction. Moreover, AI improves the speed and quality of risk management decisions, while automation lowers costs and boosts decision-making efficiency (Chakrabarti & Datta, 2024).

This study was conducted by (Hasnain Hussain, Faisal Ramzan, Amir Hamza Khan, 2025). It investigates how artificial intelligence (AI) may be used to manage financial risks, identify fraudulent activity, and improve investment strategy decision-making. It reveals a positive correlation between AI adoption and improvements in risk management, compliance, and operational efficiencies within financial institutions in Pakistan. Banks should ensure that audited data is of higher quality and that the appropriate people have real-time access to it. Banks would be urged to keep up their productivity and make judgments in real-time. (Gul & Al-Faryan, 2023). AI enhances decision-making in banks by improving risk management, regulatory compliance, and fraud detection. The study shows that AI tools significantly increase the accuracy and timeliness of compliance reporting, allowing professionals to make more informed and efficient decisions. Overall, there is a positive correlation between AI adoption and enhancements in risk management, as well as improved accuracy and timeliness in regulatory compliance reporting.

Research Methodology

The application of artificial intelligence (AI)-based data-driven decision-making in the Indian banking industry is examined in this paper using a literature review technique. A literature-based method was used to summarize the body of information, pinpoint important topics, and assess the results pertaining to the use of AI in banking decision-making. This methodology allows for a comprehensive understanding of data usage strategies, use cases, challenges, and opportunities associated with AI-driven decision-making in banking. The study aims to highlight the relevance of data in the banking sector, as there have been very few studies conducted in India on this topic, and only a limited number of banks have adopted AI for decision-making based on data. The research used resources such as Google Scholar, Scopus, government reports, and bank websites to conclude.

Discussion and Findings

The reasons behind the incorporation of AI in banking are as follows (Dr. Anil B Malali, 2020). Intense rivalry in the banking and financial sectors. Demand for process-oriented services. Banks are offering personalized services. - Customized solutions are required to maintain operational efficiency. The goals include boosting employee efficiency, increasing profitability and acceptability, lowering health and safety risks, managing enormous volumes of company data, and making effective decisions.

It has been found that one may get significant inferences from the data with the correct analytical methods. (Roeder et al., 2022). AI-based data-driven decision-making helps banks recognize suspicious transactions and patterns based on customer habits. This can work automatically, or it can also work with a hybrid method (including human intervention) and come up with an unbiased solution. Data-driven decision-making helps bankers work more efficiently and effectively. The traditional process takes too long to recognize fraud and make decisions, but now, AI-based algorithms work smartly and quickly. Banks use AI to make decisions in many daily tasks; they have separate applications or software to make better decisions. The conventional approach claims that data-driven decision-making makes judgments based on available data more quickly and accurately. Numerous banking procedures

can benefit significantly from the integration of AI technology. As an illustration, the rapid development of AI technology has prospects in the following financial domains. (singh, 2019)

Front Office

- **Customer service**
- **Sales and marketing**
 - marketing campaign
 - delivering offers
 - reviewing the offer details of an app
 - immediate interaction with virtual advisors
 - empowering the relationship manager
- Wealth advisory & financial assistance

Middle office

- **Risk assessment**
- **Fraud detection:**
 - Real-time transaction data analysis
 - Deeper KYC and understanding of parties involved
 - Reduced false positives and negatives
 - Proactive, instead of reactive management
 - Proactive compliance reports

- **Credit scoring**

Back office

- **Settlements processing**
- **Cash and liquidity management**
 - Designing a more appropriate liquidity management structure
 - What-if analysis
 - Recommending a structure change based on emerging]
- **Reconciliation**

As per an autonomous report on AI 2030, banks can save \$490 billion by adopting AI in the front office. Reductions in the size of retail branch networks, security, tellers, cashiers, and other distribution workers will account for over half of this (\$199 billion). The savings from an AI system in the middle office will total

\$350 billion. Banks and credit unions will save \$217 billion by implementing AI in compliance, KYC/AML, authentication, and other data processing areas. AI deployments will save \$200 billion in the back office.

In particular, the banking and financial industry is rich in data and has many customers. This makes it a strong contender for adopting artificial intelligence in decision-making using data (singh, 2019). Data works with machine learning technology.

A subfield of artificial intelligence called machine learning uses algorithms to extract knowledge from data with the least human involvement. Google Assistant, Alexa from Amazon, and Siri from Apple are a few instances of machine learning models. The banking and financial industry has adopted machine learning for automated lending, fraud detection, decision-making, and customer service. (singh, 2019). Artificial intelligence techniques are essential for analyzing vast amounts of data and deriving insightful information. These methods use machine learning algorithms to find data correlations, trends, and patterns. Supervised learning is a well-liked AI method in which the system is trained on labelled data to provide classifications or predictions. Unsupervised learning is another method that enables the algorithm to find links and patterns in the data without needing previous labelling.

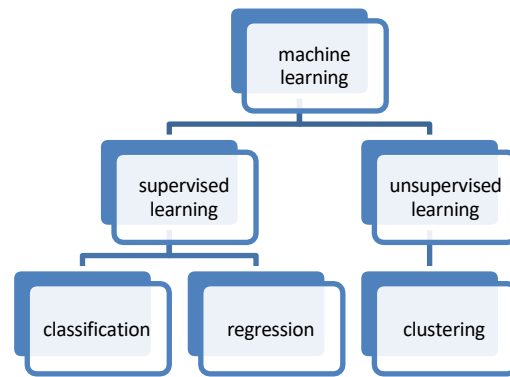


Figure 2, Source: Author's creation

What data strategy is required to succeed?

Banks first must understand the available data; labelling data comes at a considerable cost. If banks have labelled data, getting on board with supervised machine learning will be much easier. Once the supervised learning model is in place, banks can look at other models to create more value for AI and would be better off starting with a machine learning program (singh, 2019).

The most crucial element for AI to succeed and derive results is data. Rather than looking at AI from that perspective, banks first need to ask themselves what area they want to apply machine learning to. Rather than just starting the AI journey aimlessly, it is critical to understand the kind of data bank it already has. If a data strategy is not in place, AI implementation will fail, wasting time and cost (singh, 2019).

At the same time, data should be continually improved and completed before it is unified. If banks want machine learning to understand customer spending habits, then that data has to flow into the system so machine learning can learn from this supervised data. The gap in the data needs to be filled correctly to make a decision based on the data. Every data set requires training and improvements to make it particularly usable in machine learning algorithms. (singh, 2019).

Data must be treated as an intangible asset rather than a record-keeping burden. This mindset has to change.

The data quality and depth will impact the decision-making capabilities. Without a clear strategy, AI implementation will be impossible.

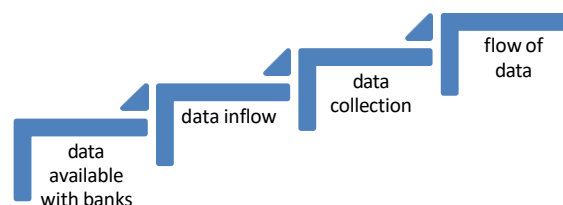


Figure 3, Source: Author's creation

There are difficulties in putting data-driven decision-making into practice. The quality and accessibility of data is one of the primary obstacles. Organizations need access to accurate and pertinent data to make wise decisions. Organizations must secure sensitive data and adhere to rules. Therefore, data privacy and security are crucial factors to take into account. Implementing Data-Driven Decision Making may also be hampered by organizational resistance to change and a lack of data literacy. AI has developed into a crucial tool for decision-making, allowing companies to assist intricate decision-making processes, evaluate data, forecast outcomes, and offer recommendations.

Use Cases of AI Adoption

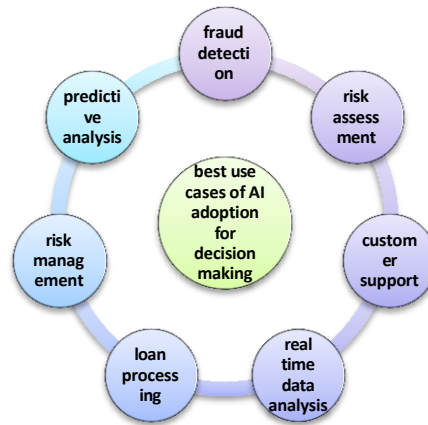


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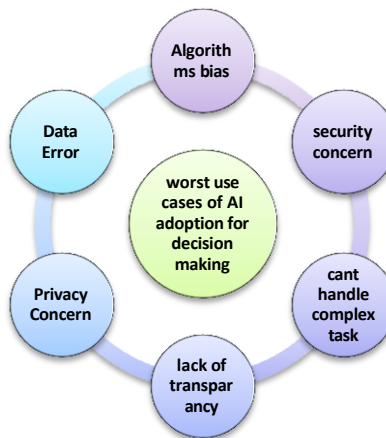


Figure 5, Source: Author's creation

For the initial stage, banks can use a low-hanging fruit approach. The target is to find the least complex use cases and apply machine learning. The low-hanging fruit approach of AI gives instant results in terms of an increase in sales and a reduction in the cost of running processes. There are difficulties in incorporating AI into decision-making. Some AI systems' 'black box' aspect is a significant worry. The transparency and interpretability of AI system's intense learning models are called the "black box" problem in artificial intelligence. Because of this problem, the decision-making process is fundamentally opaque.(Castelvecchi, 2016). Also, since AI systems may be compromised, privacy and security issues have been flagged (Paul et al., 2023).

Decision-making involves reducing several alternatives to one (Dreher & Tremblay, 2009). It involves various dimensions, such as comprehensiveness, rationality, centralization, and formalization (Papadakis et al., 1998). Decision performance largely depends on the specifics of the task and the relevant knowledge and experience that the decision-maker has (Orasanu & Connolly, 1993). Since AI can significantly expand the knowledge base for decision-making, it can also be instrumental in improving decision outcomes.

Over the decades, AI has developed from rule-based algorithms like narrow AI to rule-following models (like ML, DL, and NLP) able to learn from data (Collins, 2021). One solution to the 'black box' problem is moving to a 'white box' or 'explainable AI (XAI), which was created by merging AI and human-computer interaction (HCI) (Nazar et al., 2021). Pattern discovery and disentanglement also help to reduce bias and enhance trust in AI decision-making (Wong et al., 2023). the current debate should focus more not on whether AI should be

implemented but on how it should be implemented to assure the common good.

Human-AI Collaboration Improves Decision Quality: Even though artificial intelligence is being investigated more and more in all sectors of the economy, its use is anticipated to have a significant influence on several banking and finance functions, such as risk assessment, fraud detection, customer service, investment strategies, regulatory compliance, and more (Goel et al., 2024). Their impact on decision-making processes is increasing along with these technologies' capabilities. AI is anticipated to have the ability to automate processes, minimize human decision-making errors, and offer affordable solutions, hence reducing inefficiencies. (Goel et al., 2024). Hybrid AI-human decision-making models lead to more consistent and context-aware financial decisions. AI acts as a decision-support tool rather than a replacement, ensuring that human expertise remains crucial in financial operations. Banks leveraging augmented AI decision-making report higher accuracy, improved efficiency, and better financial risk management. Instead of taking the place of human decision-making, AI enhances it. (Jáuregui-Velarde et al., 2024).

Challenges in AI-Driven Decision-Making: While incorporating AI into banking and finance presents numerous opportunities, it also introduces challenges such as bias, a lack of transparency, and ethical data use issues, all of which necessitate a thorough examination due to their implications for the financial sector and the overall economy (Goel et al., 2024). AI systems lack contextual understanding, making it difficult for employees to interpret AI-driven insights fully. Ethical concerns such as algorithmic bias and transparency issues pose risks to fair decision-making. Over-reliance on AI can lead to the deskilling of banking professionals, requiring continuous training and upskilling initiatives. Employees must now adapt to new AI-powered workflows, develop digital literacy skills, and work alongside AI systems rather than replacing human expertise, which is entirely outdated Technology that results from a lack of technology knowledge.(Kumar et al., 2024).

Regulatory and Ethical Considerations: Ethical considerations and AI regulation were emphasized as the two main challenges to be considered while developing AI plans. Before developing AI methods, ethical and regulatory concerns centred on algorithmic openness and explainability, liability clarity, responsibility and monitoring, bias and discrimination, and privacy.(Alex Avelar & Jordão, 2024) (Future Networks (FN) Division, 2020). Stronger governance frameworks are necessary for AI-based decision-making to reduce risks associated with data protection, accountability, and transparency. For regulatory compliance, explainable AI is essential to increasing the transparency and comprehensibility of AI-driven judgments. FinTech developments are crucial to adopting AI because they ensure that the Technology complements human judgment rather than takes its place.

Conclusion and Suggestions

The findings indicate that AI has profoundly reshaped the decision-making capabilities of bank employees by enabling faster, data-driven, and analytically precise decisions. AI-powered systems assist employees in credit evaluations, fraud detection, and risk assessments, reducing reliance on subjective judgment and enhancing decision accuracy. Machine learning algorithms identify complex financial patterns humans may overlook, allowing for more informed and proactive decision-making (Holden & El-Bannany, 2004). However, AI-driven decision-making also presents challenges. Algorithmic models, while efficient, lack contextual understanding and may reinforce biases present in training data. The over-reliance on AI recommendations can reduce employees' critical thinking and discretionary judgment, leading to potential blind spots in decision-making. (Weber et al., 2024)

Furthermore, the lack of transparency in AI models makes it difficult for employees to trust AI-generated insights, raising ethical and regulatory concerns. While AI enhances decision-making efficiency, its long-term effectiveness depends on structured AI governance, interpretability of AI models, and continuous data and employee training to ensure that human expertise remains

central to financial decision-making rather than being entirely replaced by automation. The study focused on a single aspect of artificial intelligence based on data and did not delve into other areas. Future research could explore additional elements of AI with bank productivity and employee performance. This study will assist banks in considering the adoption of AI for data-driven decision-making while also informing customers about how banks are integrating Technology to enhance security and make informed decisions.

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