Artificial Intelligence (AI) in Financial Sector: Opportunities and Challenges

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Abstract
Artificial Intelligence (AI) is a fast-growing technology that enables machines to carry out tasks that require human involvement and intelligence, learning capabilities, reasoning, and decision-making skills. Although AI significantly contributes to all the major sectors like finance, healthcare, education, transportation, and agriculture. However, the application of AI may also create risks to privacy, fundamental rights, and security. Therefore, there is a need to develop AI as a human-centric technology that helps in promoting social well-being using ethical technologies. Also facilitates sustainable development (European Parliament, 2024). Artificial Intelligence (AI) is transforming the financial sector by increasing efficiency, accessibility, and accuracy. The current study explains the application of AI in the financial sector and its benefits in financial decision-making. The study further explains the various opportunities as well as challenges faced by financial institutions while adopting artificial intelligence at the operational level. It also focuses on the risk that consumers may face while doing financial transactions with the institutions using AI. Finally, the study explains the various governing steps and measures taken by the authorities to mitigate the financial risks and enable the financial institutions to become future-ready through the strategic adoption and integration of AI across their functions. The research study findings suggest that majority of financial institutions are significantly strengthening their AI Capabilities by investing more in this segment. A very small percentage of organisations are yet to apply AI. Thus suggesting extensive acceptance of AI technologies in the financial sector worldwide. Study also emphases on strong governance and robust regulatory framework to mitigate the potential risks that are associated with AI usage in the financial sector to ensure responsible and sustainable use of AI in this sector.

Keywords: Artificial Intelligence, Digital Finance, Financial Decision Making, Financial Innovation

Introduction

Financial decision making requires in-depth study and knowledge about financial products. While decision making is a cumbersome process, financial decision making requires time and efforts so that the risk of taking wrong decision can be reduced. With the incorporation of AI , decision making is becoming more reliable and easy. AI helps in analysing the financial data as well as making financial decision in less time. AI comprising of machine learning (ML), natural language processing (NLP), and deep leaning that enables data driven decision making less risky and error free. The rise of information technology (IT), expanded internet access, and the growing availability of online banking have accelerated the adoption of Artificial Intelligence (AI) in the banking sector. Technological advancements, particularly in machine learning (ML) and natural language processing (NLP), have enabled AI systems to integrate into various banking functions.

According to the India Times January 2026 report, the survey conducted by Reserve Bank of India (RBI) suggests that only 21% of the Indian Banks and Financial Institutions have either started using AI technologies or are in the process of developing solution using AI for their primary functions (Indiatimes, 2026). According to The Economic Times 2026 report, approximately 43% of the financial institutions consider AI technology for their core driver of innovation. It emphasis the increasing strategic importance of AI application in the financial sector. AI is being rapidly adopted by financial institutions to improve their operational efficiencies, enhancing customer experiences, strengthening the fraud detection process, and supporting the data-driven decision making. The report further indicates that only a minor proportion of institutions have not yet developed the AI solutions, Thus shows that the widespread acceptance of AI technologies in across the industry. The trend also reflects that the transformative role of AI in revolutionizing the financial services as well as creating the strategic c competitive advantages for the financial institutions (The Economic Times, 2026). AI offers significant benefits across multiple areas, including customer service, financial disbursement, spending analysis, and fraud detection.

Literature Review

There is a need for a strong AI governance framework in the field of finance to ensure accountability, security, transparency, and fairness in AI-driven systems. Rapid advancements are happening among financial institutions, and the need for a standardized framework for AI implementation across these institutions has become the need of the time. (Vuković, Dekpo-Adza, & Matović, 2025). AI has the potential to support organisational governance by enabling efficient decision-making using data. However, without human intervention and oversight, it may create blind spots that may lead to ethical dilemmas and algorithmic bias. Further, it may also reduce transparency and contextual understanding. By balancing AI adoption with human supervision, organisations can strengthen the decision-making process and can help build resilient governance structures in the evolving technical landscape(Al-E'mari, Sanjalawe, & Al-E'mari, 2025). By leveraging machine learning algorithms, deep learning architectures, and natural language processing, AI enables financial institutions to detect anomalies, predict risk patterns, and automate compliance processes with greater accuracy and efficiency (Oseghale & Samuel, 2025). The transition from reactive defences to proactive protection marks a critical advancement in banking security. These innovations demonstrate how financial institutions can simultaneously strengthen security, streamline operations, and enhance user experience. Continuous monitoring creates an adaptable platform capable of responding to emerging threats while ensuring regulatory compliance and maintaining reliable service across the sector (Kambhammettu, 2025).AI and ML substantially improve forecasting accuracy and portfolio management. The study also proposes future integration with emerging technologies like blockchain and quantum computing to further drive efficiency and innovation in the financial sector (Zheng, 2024). Artificial intelligence is revolutionizing the financial sector by delivering actionable insights, automating complex processes, and enhancing operational efficiency. AI technologies are enhancing the performance of financial institutions by making informed and data driven is decisions and reducing operational costs. AI is providing personalised and efficient services to customers (Divya, Shrivarshini, Karan, & Kanimozhi, 2024). According to Kaur et al. (2020), integration of AI technology in the financial sector has enhanced the automation of operational tasks, thus reducing operational errors. AI is also contributing to reducing day-to-day operational costs of the banking sector, which allows the banks to concentrate on providing value-added services to the customers (Kaur, Singh, & Sharma, 2020). In the era of digitalization, AI not only facilitates providing personalized customer services and improving customer engagement, but it also plays an important role in customer retention. As mentioned by Vijai (2019), in the highly competitive environment, customer retention is one of the key factors for long-term survival and sustainability (Vijai, 2019). However, implementing AI in banking also presents challenges. Over-automation is a major concern, as excessive reliance on AI can lead to employee dissatisfaction and potential workforce reductions. Sastry (2020) explains that automation often disproportionately impacts lower-skilled employees, resulting in layoffs or resignations. Additionally, AI-powered decision-making algorithms can introduce biases, risking inequitable treatment (Sastry, 2020). Talwar et al. (2017) highlight instances where deep learning and predictive modeling may unintentionally amplify customer biases. To address this, banks must actively work to mitigate algorithmic bias, ensuring fairness and transparency in their decision-making processes (Talwar, Pahwa, & Aggarwal, 2017).

Objectives of the study

- To understand the application of AI in Finance
- To understand various opportunities and challenges faced by financial institutions in adopting artificial intelligence (AI) in the financial sector.
- To learn the AI governance and measures taken by governing bodies to mitigate associated risks.

Methodology

This study adopts a qualitative literature review methodology, synthesizing findings from various research articles sourced from ResearchGate and Google Scholar, alongside industry reports from as well as from the organisations such as the Organisation for Economic Co-operation and Development (OECD), Financial Stability Board (FSB), and World Bank (WB), which supplement the analysis. Recent research publications released after 2020 were prioritized to capture recent developments in the area of AI in the financial sector.

5.1 Applications of AI in Finance

5.1.1 Algorithmic Trading

Algorithmic trading is also known as automated trading, Black Box trading, or Algo trading. It refers to the usage of computer programs to make trading decisions. The algorithm analyses the market and related data such as share price, trade volume, timings, and automatically places the buy or sell orders as per the situation or when specific conditions are met. It also enables traders to make financial decisions fast, as when decisions are made frequently and time is limited. Since it is algorithm based thus it is free from emotional bias and increases efficiency as well as consistency in financial or trading-related decisions (Investopedia, 2025).

5.1.2 Robo Advisor

A Robo advisor is also an algorithm-based automated financial planning and investment decision-making system that helps in collecting information about a financial situation and facilitates taking quick decisions. Financial information could be related to financial goals, risk tolerance, income status, etc. This information may be collected with the help of online questionnaires or surveys. It operates either with very little human intervention or no human intervention at all. The Robo advisor applies the predefined algorithms to provide the customised financial advice, automatically constructs the portfolio, and helps in managing it as well on behalf of the trader or user (Investopedia, 2025). As further mentioned by Investopedia (2025), Robo advisors are commonly referred as automated investment advisors, automated investment management systems or digital advice platforms which are technology driven and delivering high quality cost effective financial advisory services to its users. It helps not only in quick and efficient decision making but also enhances the users' confidence, specially the one without any formal financial education or knowledge.

5.1.3 Fraud Detection

Artificial Intelligence (AI) helps in detecting fraud in banking and financial service sectors by implementing Machine Learning (ML) algorithms. Machine Learning also facilitates mitigating fraudulent activities (IBM, 2025). As further mentioned by IBM (2025), AI models can learn to analyse large datasets to recognise not only suspicious activities but can also differentiate between legitimate and fraudulent ones. These models are also helpful in identifying possible risks of future fraudulent activities and facilitate preventing any financial crime. AI models can identify patterns that humans may not identify or recognise.

5.1.4 AI in Personalised Banking

Artificial Intelligence technology is becoming important in every sector, as in the field of banking. AI is being used to enhance both internal operations as well as customer-facing applications of the banks. It is playing a vital role in enhancing the efficiency of banking functions at every operational level and is helping in enhancing effectiveness in customer services. Further services like wealth management, regulatory compliance, and fraud detection are the areas wherein AI is contributing significantly.

5.1.5 AI in Financial Institutions

Artificial intelligence is delivering measurable value across banking operations by enhancing efficiency, risk management, and revenue generation. AI-driven processes such as fraud detection, loan processing, documentation, and customer care services are enabling institutions to save huge operational costs via automation (Chlouverakis, 2024). As further mentioned by Chlouverakis (2024), Leading institutions, including JPMorgan Chase, report improved payment validation and reduced fraud-related losses through AI adoption. AI also strengthens risk management by enabling more accurate credit assessments and fraud detection through advanced data analytics, resulting in lower default rates and improved profitability. Additionally, AI-powered personalization enhances customer engagement by tailoring financial products and investment recommendations, supporting revenue growth and long-term customer loyalty (Chlouverakis, 2024).

5.2 Opportunities and Challenges for Financial Institutions while Adopting AI across functions

The experimental phase of artificial intelligence adoption by financial institutions globally has already passed, and AI is now underway across the core operations of the institutions, from customer services to documentation, investment management, data analysis, decision-making, and risk management. The report by Finastra Financial Services State of the Nation 2026 suggests the key findings for the adoption of AI in the financial sector, which are supported by the following key findings; Only 2% of financial institutions reported no use of AI. 60% of institutions enhanced their AI capabilities during the previous year. 43% of institutions identified AI as their top innovation driver. The most common AI applications were:Risk management and fraud detection – 71%, Data analysis and reporting – 71%, Customer service assistants – 69%, Document intelligence applications – 69%. 87% of institutions plan to invest in technology modernization to support AI expansion and digital transformation (The Economic Times, 2026)

5.2.1 Perception towards AI Adoption among Financial Institutions

While financial institutions are adopting artificial intelligence for their operational efficiencies, there are various challenges for organisations while applying new technologies. As per the report published by the World Bank (2025), Various financial institutions are progressively adopting artificial intelligence (AI) across almost all operational areas to enhance efficiency. The report examines the operational effectiveness of AI implementations and highlights the key challenges faced by financial institutions worldwide in integrating these technologies.

Figure 1 shows the perception of financial institutions and Fintech firms in AI adoption.

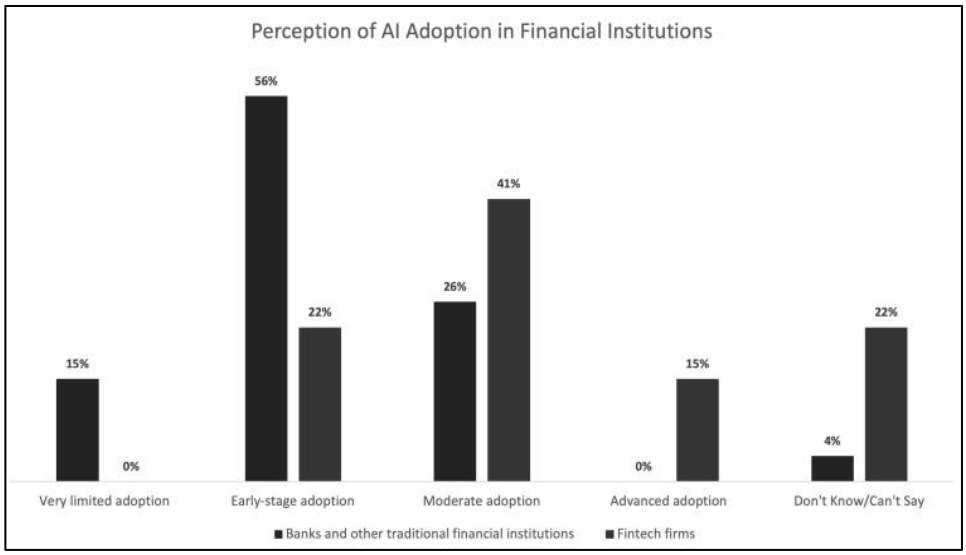

Figure 1, Source: (World Bank, 2025)

According to the report of the World Bank (2025), in emerging market and developing economies (EMDEs), fintech firms are leading AI adoption, while traditional financial institutions are progressing more gradually. Regulatory authorities consistently perceive fintechs as operating at moderate to advanced stages of AI use, in contrast to banks and other incumbents, which remain largely at early or limited adoption stages. The inequality shows that traditional financial institutions will continue facing technical constraints from legacy systems and complex regulatory compliance requirements. Whereas fintechs are the digital-first foundations (World Bank, 2025).

5.2.2 Widely Adopted AI Use Cases

World Bank (2025) report further presents the various scenarios wherein financial institutions are applying AI. These cases are shown below in Figure 2.

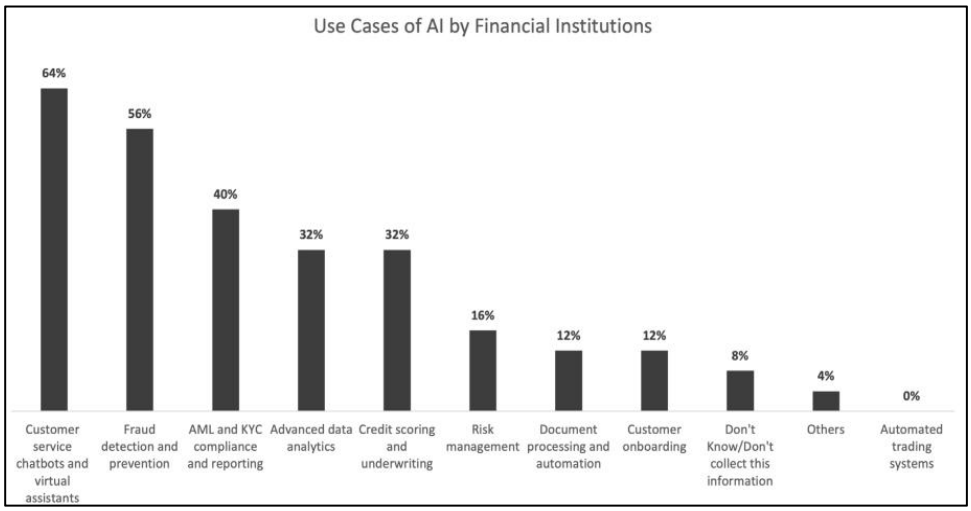

Figure 2, Source: (World Bank, 2025)

As shown above, Across financial institutions, several AI use cases are consistently reported regardless of overall adoption maturity. Among jurisdictions with at least early-stage AI implementation, the most prevalent applications include customer service chatbots and virtual assistants (64%), fraud detection (56%), and AML/CFT and KYC compliance (40%). The emergence of Generative AI has further enhanced chatbot capabilities, enabling more sophisticated customer interactions that improve retention while reducing costs (World Bank, 2025). As per the World Bank (2025), in parallel, efficiency gains in regulatory compliance remain a major driver of AI adoption. Notably, in African financial systems, credit scoring and underwriting represent a leading AI use case, reflecting the need to leverage alternative data to serve populations with limited formal credit histories.

5.2.3 AI governance and Priorities towards Risk Management

AI adoption not only enhances operational efficiencies of financial institutions, but it also increases various risks associated with financial transactions. There is a need to address those risks. Figure 3 shows the AI governance and priorities towards risk management.

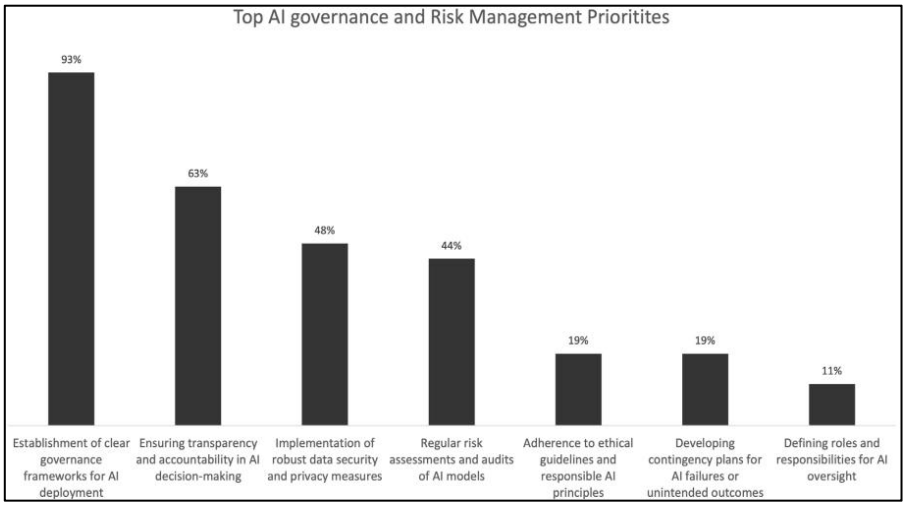

Figure 3, Source: (World Bank, 2025)

As mentioned above, authorities across emerging market and developing economies (EMDEs) are increasingly focused on AI governance and risk management as financial-sector AI use cases become more sophisticated. Regulators face the challenge of balancing innovation with the mitigation of systemic, operational, and strategic risks, making risk-based and up-to-date governance frameworks essential. As per the World Bank (2025),survey evidence shows that 93% of authorities rank clear AI governance and risk management frameworks among their top priorities, while 63% emphasize transparency and accountability in AI-driven decision-making. Additionally, 44% highlight the importance of regular risk assessments and model audits. These priorities are consistent across African and other EMDEs, with authorities underscoring the need for strong guidance from senior leadership to ensure responsible and effective AI adoption in supervision.

5.2.4 Risks Associated with Consumers

While financial institutions are improving the accuracy and speed of financial transactions with the help of AI. However, there are certain risks that consumers may face while dealing with these institutions. Figure 4 highlights the various risks associated with consumers while doing financial transactions through institutions that use AI-based technologies for their operations. The following are the risks to consumers.

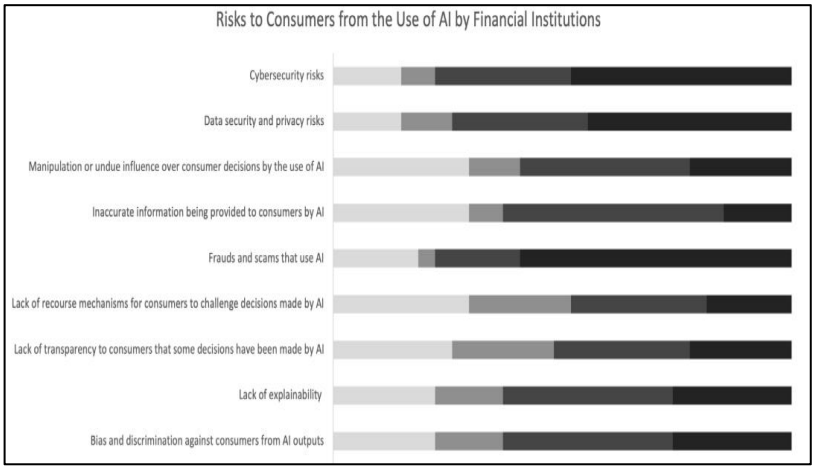

Figure 4, Source: (World Bank, 2025)

The report has highlighted the various risks to consumers from the usage of AI by financial institutions. These are data security and privacy risks, manipulation and undue influence over consumer decisions by the use of AI, inaccurate information being provided to consumers by AI, fraud and scams,

lack of recourse mechanism for consumers to challenge decisions made by AI, lack of transparency to consumers that some decisions have been made by AI, bias and discrimination against consumers from AI outputs, etc. Out of these mentioned risks, cyber security risks, fraud and scams that use AI, and data security and privacy risks are among the highly challenging ones.

5.2.5 Measures Implemented by Governing Bodies

With the increasing use of AI, there is a need to take precautionary steps to mitigate financial risks arising from AI usage while doing financial transactions to avoid major financial losses as well as fraud. Figure 5 describes the measures implemented by the governing bodies to address consumer risks while doing financial transactions through institutions using AI.

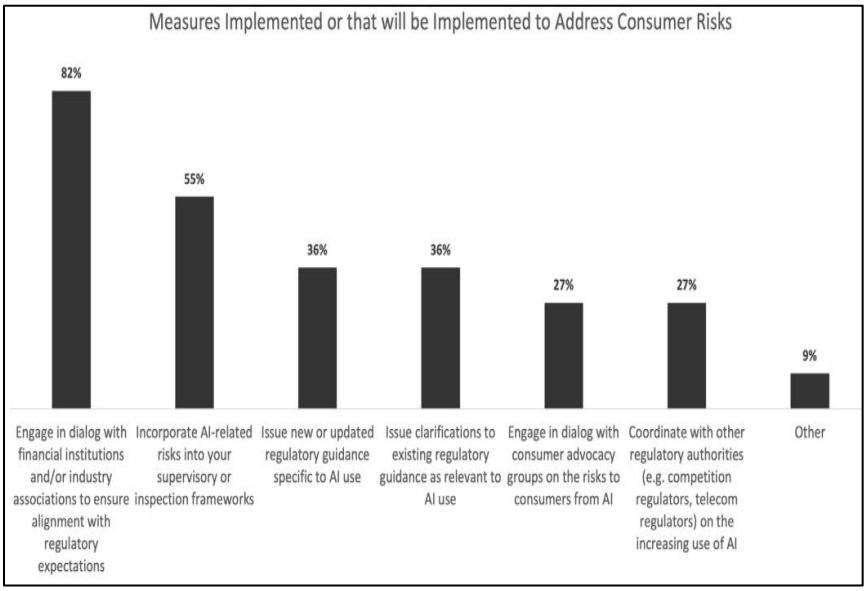

Figure 5, Source: (World Bank, 2025)

As mentioned above, the figure illustrates the measures implemented or proposed by regulatory and governing bodies to address consumer risks arising from the use of artificial intelligence in financial institutions. A significant majority of regulators (82%) engage in dialogue with financial institutions and industry associations to ensure that supervisory and inspection frameworks remain aligned with regulatory expectations in the context of AI adoption. More than half (55%) have incorporated AI-related risks into their supervisory or inspection frameworks, indicating a move toward formal oversight of AI-enabled processes. Additionally, 36% of regulators have issued new or updated regulatory guidance specific to AI use, while an equal proportion have clarified existing regulatory guidelines to address AI-related concerns. Engagement with consumer advocacy groups (27%) reflects growing attention to consumer-facing risks such as data privacy, transparency, and fairness, although this remains less widespread.

Similarly, coordination with other regulatory authorities (27%) highlights the cross-sector nature of AI risks but suggests room for stronger inter-regulatory collaboration. Overall, the measures emphasize a collaborative and supervisory approach to AI governance, with increasing but still limited focus on consumer-centric and cross-regulatory strategies. The report assesses the current state of AI adoption in financial sector supervision across EMDEs and outlines preliminary, forward-looking considerations for authorities.

On 22 May 2024, the OECD and the Financial Stability Board (FSB) convened a high-level roundtable with public and private sector experts and academics to examine emerging trends, use cases, and policy considerations related to artificial intelligence (AI) in finance. Discussions highlighted that AI adoption by banks, insurers, and asset managers is already delivering efficiency gains in areas such as risk modelling, trading, claims processing, fraud detection, and financial crime prevention (OECD;FSB, 2024). As further mentioned by OECD; FSB (2024), while Generative AI is increasingly being explored, its current impact within regulated financial institutions remains largely operational rather than transformational. Supervisory authorities are also leveraging AI to enhance their ability to process and analyze large volumes of data However, participants emphasized that AI adoption introduces significant risks, including model risk, data protection and privacy concerns, governance and ethical challenges, and potential financial stability implications stemming from increased interconnectedness,

complexity, and model opacity. To address these challenges, policymakers were encouraged to promote the safe and responsible use of AI in financial services, with a strong emphasis on global cooperation to develop consistent standards, share best practices, and mitigate systemic risks (OECD;FSB, 2024).

SEBI's 2019 Circulars mandated reporting of AI/ML usage by stock brokers, depository participants, Market Infrastructure Institutions (MIIs) such as stock exchanges, clearing corporations and depositories, and mutual funds to understand adoption and ensure preparedness for artificial intelligence (AI) and machine learning (ML) risks (SEBI, 2024). As per SEBI (2024), AI/ML applications are increasingly integrated into core operations (surveillance, risk management, KYC, cyber security) and investor facing activities (order execution, customer service, segmentation). Benefits include operational efficiency, accurate decision-making, enhanced cyber security, regulatory compliance, and improved investor experience. Responsible deployment of AI/ML is essential to safeguard investor interests and maintain trust. This initiative reinforces accountability, promotes responsible AI adoption, mitigates potential investor harm, and aligns SEBI regulated entities with global best practices in AI governance (SEBI, 2024).

Key findings

The present research study shows that AI has become an essential part of the financial sector, helping smooth conduction of day-to-day operations as well as data-driven decision-making. As mentioned by the Finastra Financial Services State of the Nation 2026 report, only 2% of financial institutions across the world have not yet adopted AI in their operations and functioning, which indicates that the majority of institutions are applying AI . Reports have suggested that the majority of financial institutions have adopted AI to perform day-to-day functions worldwide . A very small percentage of organisations are yet to apply AI. Thus suggesting extensive acceptance of AI technologies in the financial sector worldwide. The majority of institutions are significantly strengthening their AI Capabilities by investing more in this segment. The major tasks performed by AI in the financial sector include risk management, fraud detection, data analysis, financial reporting, documentation, and customer experience. Reports further suggest that many financial institutions are planning to modernize their technology infrastructure to support further AI adoption and digital transformation. Fintech companies have been adopting AI technologies more rapidly compared to traditional financial institutions. However, Traditional institutions are now also increasing the usage of AI technologies in their day-to-day operations. Overall, AI is no longer viewed as an optional technology but is becoming an integral part of financial operations, which is helping in transforming financial services by making them more accurate, effective, and efficient.

Conclusion

Artificial intelligence is no longer an optional technology in the financial sector but has become an integral part of day-to-day operations. Fintech companies are adapting AI technologies faster than traditional financial institutions. However, reports suggest that traditional financial institutions are also increasing the scope of AI adoption and applications in their operations. Overall, AI technology is making financial services more effective and efficient. Risks that are associated with AI usage in the financial sector can be mitigated via strong governance and regulatory oversight to ensure responsible and sustainable use of AI in the financial sector.

Suggestions for Future Research Studies

In future , research studies focusing on exploring factors influencing the rapid and smooth adoption of AI among financial institutions may be conducted. Examination of the effectiveness of recent AI governance and regulatory frameworks may also be conducted for AI adoption. Further research studies may also be conducted on analysing the potential of inter-regulatory coordination for a more integrated approach. Finally, research may be conducted in the area of ethical and social implications of AI in the financial sector, stressing financial inclusion, fairness, and inclusive AI adoption strategies in the financial sector.

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