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ORIGINAL



Artificial Intelligence and Risk Management in Financial Institutions: Evidence from the UK Banking Sector

Inteligencia Artificial y Gestión de Riesgos en las Instituciones Financieras: Evidencia del Sector Bancario del Reino Unido

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ABSTRACT

Introduction: Artificial Intelligence (AI) has become a transformative force in the global financial sector, reshaping how institutions assess, predict, and mitigate risks. In the United Kingdom, major financial institutions have rapidly adopted AI-driven technologies to enhance operational efficiency and ensure regulatory compliance.

Objective: this study investigates the impact of AI on risk assessment and management among financial institutions in the United Kingdom, focusing on the extent of AI tool adoption and its influence on decision-making and compliance processes.

Method: a quantitative survey research design was employed. Data were collected from 150 banking professionals across five major institutions, Barclays, Halifax, Lloyds, Nationwide Building Society, and NatWest Bank, using a structured five-point Likert scale questionnaire. A total of 138 valid responses were analyzed using descriptive statistics.

Results: findings revealed widespread adoption of AI tools such as chatbots, robotic process automation (RPA), credit scoring models, behavioral biometrics, and algorithmic trading. Respondents strongly agreed that AI automates critical aspects of risk management (Mean = 4,43), streamlines KYC and AML compliance (Mean = 4,41), and enhances fraud detection (Mean = 4,20). The results further indicated improved precision in risk modeling and decision-making processes (Mean = 4,30).

Conclusion: the study concludes that AI has significantly enhanced efficiency, accuracy, and transparency in risk management among UK financial institutions. However, concerns persist regarding algorithmic bias, ethical accountability, and data privacy. The study recommends that financial institutions adopt explainable AI frameworks and regulators develop ethical guidelines for responsible AI integration.

Keywords: Artificial Intelligence; Risk Management; Financial Institutions; Machine Learning; United Kingdom.

RESUMEN

Introducción: la Inteligencia Artificial (IA) se ha convertido en una fuerza transformadora en el sector financiero mundial, redefiniendo la forma en que las instituciones evalúan, predicen y mitigan los riesgos. En el Reino Unido, las principales instituciones financieras han adoptado rápidamente tecnologías impulsadas por IA para mejorar la eficiencia operativa y garantizar el cumplimiento normativo.

Objetivo: este estudio investiga el impacto de la IA en la evaluación y gestión de riesgos entre las instituciones financieras del Reino Unido, centrándose en el grado de adopción de herramientas de IA y su influencia en la

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toma de decisiones y los procesos de cumplimiento.

Método: se utilizó un diseño de investigación cuantitativo basado en encuestas. Los datos se recopilaron de 150 profesionales bancarios pertenecientes a cinco instituciones principals, Barclays, Halifax, Lloyds, Nationwide Building Society y NatWest Bank, mediante un cuestionario estructurado con escala Likert de cinco puntos. Un total de 138 respuestas válidas se analizaron utilizando estadísticas descriptivas.

Resultados: los hallazgos revelaron una adopción generalizada de herramientas de IA como chatbots, automatización robótica de procesos (RPA), modelos de calificación crediticia, biometría conductual y comercio algorítmico. Los encuestados coincidieron en que la IA automatiza aspectos clave de la gestión de riesgos (Media = 4,43), optimiza el cumplimiento KYC y AML (Media = 4,41) y mejora la detección de fraudes (Media = 4,20). Además, se observó una mayor precisión en la modelización de riesgos y en los procesos de toma de decisiones (Media = 4,30).

Conclusión: el estudio concluye que la IA ha mejorado significativamente la eficiencia, precisión y transparencia en la gestión de riesgos de las instituciones financieras del Reino Unido. Sin embargo, persisten preocupaciones sobre el sesgo algorítmico, la responsabilidad ética y la privacidad de los datos. Se recomienda que las instituciones adopten marcos de IA explicable y que los reguladores desarrollen directrices éticas para una integración responsable de la IA.

Palabras clave: Inteligencia Artificial; Gestión de Riesgos; Instituciones Financieras; Aprendizaje Automático; Reino Unido.

INTRODUCTION

The global financial sector is undergoing an unprecedented transformation driven by technological advancements, with Artificial Intelligence (AI) positioned at the center of this revolution. (1) AI encompasses a wide range of computational techniques, including machine learning (ML), natural language processing (NLP), predictive analytics, and robotic process automation (RPA), which collectively enable machines to perform tasks that traditionally require human intelligence. (2,3,4) These technologies are reshaping the ways financial institutions operate, analyze data, manage risks, and make strategic decisions. (5) The banking industry, in particular, has emerged as one of the most significant beneficiaries of AI integration due to its heavy reliance on data analytics, regulatory compliance, and real-time decision-making. (6)

In the United Kingdom (UK), the adoption of AI within financial institutions has accelerated dramatically over the past decade. (7) UK-based financial institutions such as Barclays, Lloyds Bank, NatWest, and HSBC have deployed AI tools across various domains, including credit risk modeling, customer behavior analysis, regulatory compliance, fraud detection, and operational optimization. (8) This rapid integration is largely motivated by the increasing volume and complexity of financial data and the growing demand for efficiency, cost reduction, and competitive advantage in a rapidly evolving digital economy. (1) According to the OECD (9), the financial services sector in the UK accounts for some of the highest investments in AI technologies in Europe, reflecting its strategic importance to institutional performance and national economic competitiveness.

Risk management remains one of the most critical areas where Al's transformative potential is being realized. Financial institutions face a complex and interdependent risk landscape that includes credit risk, market risk, operational risk, cybersecurity risk, and compliance risk. (10) Traditional risk assessment models, which often depend on static historical data and manual processes, are increasingly inadequate for addressing the real-time dynamics of global financial systems. (11) In contrast, Al-driven risk assessment systems leverage large-scale data analytics to identify, quantify, and mitigate potential risks with unprecedented speed and precision. For example, machine learning models can analyze diverse datasets, ranging from customer credit histories and transactional patterns to social and macroeconomic indicators, to generate more accurate credit scoring and risk predictions (12). This capability enhances financial inclusion by enabling institutions to extend credit to previously underserved clients while minimizing default rates. (5)

Moreover, AI has revolutionized operational and regulatory risk management in the UK's banking sector. Through Robotic Process Automation (RPA), institutions automate repetitive compliance tasks such as Know Your Customer (KYC) and Anti-Money Laundering (AML) checks, ensuring consistency and adherence to regulatory requirements. (13) Similarly, Natural Language Processing (NLP) tools are used to monitor regulatory updates and interpret complex legal documents, allowing banks to remain compliant with evolving frameworks such as Basel III and the General Data Protection Regulation (GDPR)). (7) AI also supports real-time monitoring of financial transactions, facilitating the detection of anomalies and potential threats before they escalate into significant risks. (8) Collectively, these applications contribute to a proactive and adaptive risk management environment where decision-making is evidence-driven rather than intuition-based.

Nevertheless, the integration of Al into risk management frameworks presents both opportunities and

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challenges. While AI enhances efficiency, transparency, and predictive accuracy, it simultaneously introduces new categories of risks related to algorithmic bias, data privacy, and model interpretability. (6,14,15,16) For instance, AI models trained on biased or incomplete datasets may inadvertently perpetuate discrimination, resulting in unfair lending decisions or inaccurate risk classifications. (5) Similarly, the "black box" nature of some AI systems complicates the transparency and explainability of automated decisions, which is an issue that regulators increasingly seek to address. (17) Moreover, ensuring data security and ethical governance remains a top concern, as financial institutions manage vast amounts of sensitive customer data. (2) As noted by Dwivedi et al. (18), the successful integration of AI in risk management depends not only on technological sophistication but also on the establishment of robust governance structures that uphold accountability and ethical standards.

The UK's financial institutions thus stand at a crossroads where innovation and regulation intersect. While AI adoption promises to enhance the speed, reliability, and scope of risk management, institutions must navigate the complexities of transparency, compliance, and societal trust. According to the Nastoska et al.⁽¹⁹⁾, future risk management standards will increasingly emphasize verifiability, transparency, and fairness in the use of AI for financial applications, underscoring the urgency for continuous assessment of its implications. Against this backdrop, this study examines the impact of Artificial Intelligence on risk assessment and management among financial institutions in the United Kingdom.

The study contributes to a deeper understanding of how intelligent systems are reshaping traditional banking operations, mitigating uncertainties, and redefining the nature of decision-making in one of the world's most advanced financial ecosystems. The findings will not only inform institutional strategies for sustainable technology adoption but also provide valuable insights for policymakers seeking to balance innovation with regulatory oversight.

METHOD

This study adopted a quantitative cross-sectional survey design to examine the impact of Artificial Intelligence (AI) on risk assessment and management among financial institutions in the United Kingdom. The research was conducted between January and May 2024 across selected banking institutions with established AI-driven operations. The United Kingdom was chosen as the study area because of its advanced digital banking ecosystem and its pioneering adoption of AI technologies in financial services. The design was considered appropriate because it allowed for the objective collection and statistical analysis of numerical data to measure banking professionals' perceptions of AI's role in risk identification, analysis, and mitigation. (20,21,22)

The target population for the study comprised professional bankers working in departments directly or indirectly involved in risk management, compliance, data analytics, information technology, and operations. Five major financial institutions, Barclays Bank, Halifax Bank, Lloyds Bank, Nationwide Building Society, and NatWest Bank, were purposively selected due to their significant investment in AI tools and their leadership in financial technology innovation within the UK. A total of 150 respondents were selected using a simple random sampling technique to ensure that participants were drawn from various professional categories across the selected institutions. Out of the 150 questionnaires distributed, 138 were properly completed and returned, representing a 92 percent response rate.

The inclusion criteria covered banking professionals with at least two years of experience in their respective institutions and those who were directly involved in risk assessment, compliance, or the use of AI-enabled systems in operational or decision-making processes. Temporary or contract staff who were not directly engaged in risk management functions, as well as respondents who declined consent or submitted incomplete responses, were excluded from the study. This ensured that only participants with relevant knowledge and practical exposure to AI tools in financial operations were included in the analysis.

The study investigated both independent and dependent variables. The independent variable was the adoption of Artificial Intelligence tools, while the dependent variable was the effectiveness of risk assessment and management processes. The sub-variables under AI adoption included the availability and utilization of AI tools such as chatbots, robotic process automation, natural language processing, behavioral biometrics, and algorithmic trading systems. Other aspects measured included the degree of automation achieved in risk management processes, the accuracy of fraud detection, and the efficiency of compliance activities such as Know Your Customer (KYC) and Anti-Money Laundering (AML) checks. Each item was rated on a five-point Likert scale ranging from "Strongly Disagree" (1) to "Strongly Agree" (5), allowing for the quantification of respondents' perceptions.

Data were collected through a structured questionnaire developed after a comprehensive review of relevant literature on the application of AI in financial risk management. (7,11,13) The questionnaire consisted of two sections: the first obtained demographic information such as position, department, and years of experience, while the second contained statements designed to assess perceptions regarding the use and effectiveness of AI tools in risk-related functions. To ensure the instrument's validity, three experts in banking technology, financial risk management, and research methodology reviewed the questionnaire for content relevance, clarity, and

logical structure. Their feedback informed necessary revisions. The reliability of the instrument was confirmed through a pilot test conducted with 20 banking professionals from institutions not included in the final sample. The internal consistency of the instrument yielded a Cronbach's alpha value of 0,88, indicating a high level of reliability.

The questionnaire was administered electronically using Google Forms to promote efficiency, accessibility, and confidentiality. Each participant received an introductory note outlining the purpose of the study, the voluntary nature of participation, and data protection assurances. Respondents were given two weeks to complete the questionnaire, and follow-up reminders were sent via email to enhance the response rate. All collected responses were securely stored and used solely for academic purposes.

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 26.0. Descriptive statistics, including frequency distributions, percentages, means, and standard deviations, were used to analyze the research questions. (23) The interpretation of results was based on a mean rating scale ranging from 1,00 to 1,80 (Strongly Disagree) to 4,21-5,00 (Strongly Agree). The analysis provided a clear quantitative understanding of how Al adoption influences risk management practices within financial institutions in the United Kingdom.

All ethical principles guiding academic research were strictly observed throughout the study. The research adhered to the ethical standards of the United Kingdom Data Protection Act of 2018 and the General Data Protection Regulation (GDPR). Participation was entirely voluntary, and respondents were informed of their right to withdraw at any stage of the study without any consequence. Personal identifiers were not collected, ensuring the anonymity of participants and confidentiality of data. Furthermore, all secondary sources consulted in the development of the instrument and the final report were duly acknowledged to maintain academic integrity and transparency.

RESULTS

A total of one hundred fifty (150) questionnaires were distributed, but only one hundred thirty-eight (138) were submitted. The results of this study are presented in tables. Table 1 reflects the available artificial intelligence tools used by the financial institutions in the UK.

Table 1. Available artificial intelligence tools used by the financial institutions in the UK										
S/N	Artificial Intelligence Tools	A (2)	NA (1)	Decision						
1	Chatbots and Virtual Assistants	ſ	-	А						
2	Robotic Process Automation (RPA)	ſ	-	Α						
3	Credit Scoring and Underwriting	ſ	-	Α						
4	Know Your Customer (KYC) Compliance	ſ	-	Α						
5	Natural Language Processing (NLP)	ſ	-	Α						
6	Behavioral Biometrics	ſ	-	Α						
7	Voice and Speech Recognition	ſ	-	Α						
8	Algorithmic Trading	ſ	-	Α						
9	Al-Enhanced Risk Management	ſ	-	Α						
10	Pattern Recognition	ſ	-	Α						
11	Machine Learning Models	ſ	-	Α						
12	Thumb/Finger printing	ſ	-	А						
	Total	138 (100 %)	-							
Keys: A: Available; NA: Not Available										

Based on the responses from 138 participants regarding the identification of available Artificial Intelligence (AI) tools used by financial institutions in the UK, a diverse range of AI technologies were reported. These include Chatbots and Virtual Assistants, Robotic Process Automation (RPA), Credit Scoring and Underwriting, Know Your Customer (KYC) Compliance, Natural Language Processing (NLP), Behavioral Biometrics, Voice and Speech Recognition, Algorithmic Trading, AI-Enhanced Risk Management, Pattern Recognition, Machine Learning Models, and Thumb/Fingerprinting. This comprehensive list reflects the extensive utilisation of AI across various functions within financial institutions, highlighting the sector's commitment to leveraging technological advancements for improved efficiency, risk management, and customer service. The presence of such a wide array of AI tools underscores the industry's recognition of the transformative potential of AI

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in enhancing operations, decision-making processes, and regulatory compliance within the financial services landscape.

Table 2. Impact of Artificial Intelligence on Risk Assessment and Management among Financial Institutions in the UK											
S/N	Statements	SA	Α	N	D	SD	Mean	Std. Dev.			
1	Al allows financial institutions to create customized risk assessment models that consider specific risk factors and customer profiles.	62	40	2	24	10	3,87	1,34			
2	Al-driven fraud detection systems are highly effective in identifying unusual transaction patterns and potential fraudulent activities.	70	50	1	10	7	4,20	1,10			
3	Al-driven risk assessment models can analyze vast amounts of data with speed and precision.	80	40	2	11	5	4,30	1,07			
4	All automates many aspects of risk assessment and management, including data analysis, compliance checks, and fraud detection.	100	20	4	6	8	4,43	1,12			
5	Al tools streamline regulatory compliance by automating KYC (Know Your Customer) and AML (Anti-Money Laundering) checks.	90	30	6	9	3	4,41	0,99			
6	Al systems can monitor transactions and market conditions in real time, providing continuous risk assessment.	60	50	4	14	10	3,99	1,23			

Table 2 presents the findings on the impact of Artificial Intelligence (AI) on risk assessment and management among financial institutions in the United Kingdom. The computed mean values, which range from 3,87 to 4,43, indicate a generally high level of agreement among respondents regarding the positive influence of AI on different aspects of risk assessment and management. As shown in Table 2, the statement "AI automates many aspects of risk assessment and management, including data analysis, compliance checks, and fraud detection" recorded the highest mean score of 4,43, signifying that respondents strongly agreed that AI has significantly transformed and automated traditional risk management processes. This finding underscores the growing reliance on AI algorithms and robotic process automation (RPA) in streamlining risk-related activities and ensuring operational efficiency in the UK banking sector. Similarly, the statement "AI tools streamline regulatory compliance by automating KYC (Know Your Customer) and AML (Anti-Money Laundering) checks" ranked closely behind with a mean of 4,41, further demonstrating the confidence of financial institutions in AI's capacity to enhance compliance accuracy and reduce human errors in regulatory reporting. This high level of agreement reflects the increasing adoption of AI-driven compliance solutions that align with global regulatory frameworks such as the General Data Protection Regulation (GDPR) and Basel III.

The statement "AI-driven risk assessment models can analyze vast amounts of data with speed and precision" obtained a mean score of 4,30, which also indicates a strong agreement among respondents. This suggests that bankers acknowledge AI's superior analytical capabilities in processing large data volumes to identify potential risk factors more effectively than traditional manual models. Likewise, the statement "AI-driven fraud detection systems are highly effective in identifying unusual transaction patterns and potential fraudulent activities" recorded a mean of 4,20, showing that respondents recognize the effectiveness of AI-powered systems in enhancing fraud detection and prevention through real-time monitoring and anomaly detection mechanisms.

Conversely, the statement "Al systems can monitor transactions and market conditions in real time, providing continuous risk assessment" had a slightly lower mean score of 3,99, which still reflects agreement but with relatively less intensity. This may suggest that while Al has proven effective in real-time monitoring, its full potential in continuous, autonomous risk assessment may still be evolving within some institutions. Similarly, the statement "Al allows financial institutions to create customized risk assessment models that consider specific risk factors and customer profiles" recorded the lowest mean score of 3,87, indicating moderate agreement. This could imply that while customization through Al is acknowledged, its implementation might vary among institutions, depending on data infrastructure, investment capacity, and technical expertise.

DISCUSSION

The findings of this study provide clear evidence that Artificial Intelligence (AI) has been widely adopted and is exerting a significant impact on risk assessment and management among financial institutions in the United Kingdom. The findings reveal that financial institutions in the UK make extensive use of AI tools such as chatbots and virtual assistants, robotic process automation (RPA), credit scoring and underwriting systems, Know Your Customer (KYC) compliance mechanisms, natural language processing (NLP), behavioral biometrics, voice and speech recognition, algorithmic trading systems, pattern recognition, machine learning models, and AI-enhanced risk management applications. This widespread adoption reflects a growing institutional commitment to leveraging AI for strategic and operational efficiency. This finding is consistent with Roberts and Patel, who observed that UK financial institutions have accelerated AI adoption in key areas such as customer service,

compliance, and fraud detection, driven by the need for automation and data-driven insights. Similarly, Smith⁽¹⁾ and Chen et al.⁽²⁾ reported that Al has become an indispensable part of modern banking systems, enabling data-centric decision-making and real-time operations. The current study affirms these conclusions by demonstrating that UK banks employ a wide range of intelligent systems not only for customer interactions but also for more critical areas such as risk analysis, fraud mitigation, and regulatory compliance. Furthermore, this finding corroborates Johnson⁽⁸⁾, who described the UK as a global leader in the financial application of emerging technologies due to its mature financial ecosystem and regulatory openness. The deployment of RPA, NLP, and biometric authentication technologies observed in this study also aligns with La Torre et al.⁽¹³⁾, who emphasized that Al enhances operational transparency and helps financial institutions achieve compliance with frameworks such as Basel III and the GDPR.

The finding further indicates that AI has had a positive and transformative impact on risk assessment and management practices in UK financial institutions. Respondents overwhelmingly agreed that AI supports the creation of customized risk models, enhances fraud detection, automates compliance processes, and enables continuous, real-time monitoring of transactions and market conditions. This outcome strongly supports the assertions of Phua et al. (11), who maintained that AI-driven models outperform traditional risk models due to their ability to process vast datasets with greater accuracy and speed. Similarly, Aziz et al. (12) noted that AI-based predictive analytics substantially improve credit and operational risk assessment by revealing complex patterns that manual analysis cannot easily detect. The present findings mirror these scholarly views, showing that AI adoption contributes to improved decision-making precision and proactive risk mitigation.

Moreover, the results align with Cruz⁽¹⁰⁾, who contended that the interconnectedness of modern financial systems demands adaptive and intelligent risk management tools. The study confirms that AI technologies allow financial institutions to respond dynamically to emerging risks by automating compliance checks and detecting anomalies in real time. This automation was also emphasized by Dwivedi et al.⁽¹⁸⁾, who found that RPA and machine learning tools play a pivotal role in managing regulatory and operational risks.

The finding that AI enhances regulatory compliance through KYC and AML processes supports La Torre et al. (13), who argued that AI ensures consistency and reliability in compliance reporting. It also concurs with Brown et al. (6), who asserted that AI fosters transparency and accuracy in risk-related decisions, helping institutions maintain both regulatory and reputational integrity. However, despite these strong positive associations, the findings also echo ongoing concerns highlighted in the literature. Issues of algorithmic bias, ethical accountability, and data privacy remain pertinent, as observed by Chen et al.(2) and Cirqueira et al.(17) Although respondents in this study acknowledged AI's effectiveness, they also recognized that challenges persist in ensuring fairness and explainability in Al-driven decisions. This underscores Dwivedi et al. (18)'s argument that successful AI integration requires robust governance structures alongside technological innovation. However, this study has some limitations. First, the study was limited by its sample size and geographical scope, focusing on five major financial institutions, including Barclays, Halifax, Lloyds, Nationwide Building Society, and NatWest Bank. While these institutions are representative of the UK banking sector, their inclusion may not fully capture the experiences of smaller banks, credit unions, or emerging fintech firms that also employ Aldriven risk management systems. Consequently, the generalizability of the findings beyond large, established institutions may be somewhat constrained. Future research should therefore consider expanding the sample to include a broader range of financial organizations across different regions and operational scales to obtain a more comprehensive perspective.

Second, the study employed a quantitative survey design that relied on self-reported data obtained through structured questionnaires. Although this approach allowed for objective statistical analysis, it may not fully reflect the complexity and contextual nuances of how AI operates in real-life risk management environments. Respondents' perceptions might also be influenced by organizational culture, technological maturity, or personal experience with AI tools. To address this limitation, future studies could adopt a mixed-methods approach, combining quantitative surveys with qualitative techniques such as interviews or case studies to gain deeper insights into the practical and ethical dimensions of AI adoption. Third, the study focused specifically on the risk assessment and management functions of financial institutions. While this focus aligns with the study's objectives, it inevitably excluded other strategic areas where AI may play equally important roles, such as customer relationship management, investment analysis, and strategic forecasting. Further research could therefore explore how AI influences these additional domains, as well as the interconnections between AI-enabled risk management and overall institutional performance.

CONCLUSIONS

This study set out to examine the impact of Artificial Intelligence (AI) on risk assessment and management among financial institutions in the United Kingdom. The findings confirm that AI has moved beyond experimental adoption to become a strategic pillar in modern banking operations. In addressing the study objectives, the research established that UK financial institutions have widely adopted AI-driven tools to support comprehensive

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risk identification and management processes. These tools have enabled more structured, data-informed decision-making and improved institutional capacity to anticipate and mitigate emerging risks.

The study also demonstrated that the integration of AI has redefined traditional approaches to risk governance, fostering a more proactive, automated, and transparent risk management culture. This transformation has strengthened institutional resilience and enhanced regulatory compliance, showing that AI now functions as both a technological innovation and a governance mechanism in the UK banking ecosystem. Nonetheless, the study underscores that AI's effectiveness in risk management depends on responsible adoption, guided by transparency, accountability, and ethical standards. Sustainable implementation requires that financial institutions integrate explainable AI models, regulators establish robust auditing and ethical frameworks, and academia foster continuous research and training in AI-based financial analytics. Based on the findings of this study, the following recommendations are proposed for key stakeholders in the UK financial sector:

- 1. Financial institutions should formally integrate AI technologies into their enterprise risk management systems to enhance predictive analytics, automate compliance, and strengthen real-time monitoring of market and credit risks. They should adopt explainable AI models that allow human oversight and ensure decision-making processes are transparent to regulators, auditors, and customers.
- 2. Regulatory bodies should develop comprehensive guidelines and auditing frameworks that define acceptable AI use in financial risk management, focusing on fairness, accountability, and privacy protection. Also, they should require periodic audits of AI systems used by banks to detect potential biases or discriminatory outcomes in lending, credit scoring, or risk assessments.
- 3. Higher education institutions should strengthen research partnerships with the banking industry to explore innovative applications of AI in risk modeling, fraud detection, and compliance optimization.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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