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From glass ceilings to smart systems: Investigating the Link between gender-inclusive corporate boards and AI transformation in banking

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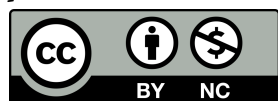
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Abstract

This study examines the association between gender-inclusive boards and AI adoption in Nigeria's banking sector, with particular attention to board leadership, regulatory compliance and risk management. Using a cross-sectional survey design, data were collected through structured questionnaires administered to 100 employees of listed Nigerian banks between February and June 2025. The population of the study consists of all 12 commercial banks listed on the Nigerian exchange Group (NGX). A purposive sampling technique was used to select 5 banks based on total assets and market capitalisation. A total of 100 employees participated in the survey, representing approximately 20 respondents from each bank. Respondents were drawn from executive management, customer service and risk/compliance and IT units. Board-level variables such as gender inclusion and board leadership were obtained from the corporate governance disclosures of sampled banks which were then matched with employee survey responses from the corresponding bank. Thus, employee perceptions of AI adoption, regulatory compliance and risk balance were analysed alongside bank-specific governance characteristics. Multiple regression model was used to estimate the data. The results revealed significant positive associations between gender inclusion ($= 0.297, p < 0.05$), board leadership ($= 0.331, p < 0.05$), regulatory compliance ($= 0.309, p < 0.05$), risk management ($= 0.115, p < 0.05$) and AI adoption, with the regression model explaining 74.1 percent of the variation in AI uptake across sampled banks. The findings suggest that banks with stronger gender representation on boards tend to report higher levels of AI adoption and stronger governance practices. The study concludes that gender diversity on boards enhances banks' capacity to navigate digital transformation responsibly. Therefore, the study recommends targeted training for board members, policy incentives for diversity, and integrated compliance mechanisms to ensure sustainable and inclusive AI-driven innovation in the financial sector.

Keywords

Gender diversity, board leadership, risk management, AI transformation, banking

1 Introduction

Artificial Intelligence (AI) has expanded rapidly in the last decade, creating a strong demand for new skills. Although more women are now gaining AI-related skills, they still represent only about 22% of AI professionals globally (Maji & Saha, 2024). A clear gender gap exists across industries, job roles and skill types. Women are more likely to have advanced skills in areas such as deep learning, neural networks and computer vision, but they are less represented in fields like information retrieval, natural language processing and data structures. Research has also shown that female representation on corporate boards can influence banking strategies, especially those that support environmentally responsible firms. This highlights the positive effects of gender-diverse decision-making on the performance of banks and, by extension, on the global economy (Saha, 2023).

In the AI industry, women are often found in roles related to research, teaching, information management and data analysis. Men, however, dominate higher-paying positions such as software engineering and top leadership roles. Women remain underrepresented in the technology field, and this imbalance is even more noticeable in AI. Bridging this gender gap is not only important for fairness and equality but also has economic advantages for companies and countries (Abidin et al., 2024). The rise of digital technologies has transformed many aspects of human life, including how goods are produced, sold and traded. These digital changes have also affected workplaces, teamwork and business operations. However, not everyone benefits equally from these opportunities.

Evidence increasingly shows that having more women in leadership positions improves business performance in the banking industry. Organisations with diverse leadership teams tend to be more innovative and perform better overall (Biduri, 2023). A report by the International Labour Organization (ILO) found that firms with strong diversity and inclusion programs enjoy higher profits, better productivity, improved employee retention, greater creativity and stronger customer satisfaction. Diverse perspectives on company boards also enhance decision-making by helping leaders better understand complex challenges (Luanglath, 2023).

Gender inclusion strengthens decision-making by bringing multiple viewpoints and reducing bias (Galbreath, 2024). Women often introduce new ideas and help minimise risks, thereby improving board governance (Galletta, 2025). Their involvement in policymaking is essential for banks – not only for fairness but also because it produces better outcomes. Although some progress has been made toward gender equality, there is still a need to increase the number of women serving on bank boards. The policies a bank adopts often reflect the diversity of its board. When adopting financial technologies, bank boards may face challenges in balancing innovation with environmental concerns and financial implications. Nugroho (2023) found that financial technology could worsen the negative effects of IT spending on financial performance. However, only a few studies have examined how financial technology affects environmental performance.

According to Alotaibi (2024), AI has proven valuable for the banking sector but still poses challenges such as lack of transparency, security risks and data privacy issues. Hinge (2022) noted that banks adopting AI must comply with regulatory standards, particularly in data privacy for online banking services. Doumpos (2022) highlighted a shortage of training among banking staff in advanced AI tools. Although technological progress is reshaping the banking industry, integrating AI effectively remains difficult. The main challenges include improving customer experience, ensuring strong security, enhancing operational efficiency, managing risks and meeting regulatory requirements. Despite its benefits, AI adoption faces obstacles related to data quality, privacy concerns, inadequate infrastructure and limited skilled personnel.

Gender inclusion on bank boards remains a key issue because digital banking platforms are central to innovation, risk management, regulatory compliance and consumer protection – factors critical to the sustainable growth of AI (Bejjani, 2023). Innovation in modern banking is increasingly driven by AI, supported by board members who encourage the use of advanced technologies in payments, lending, insurance and investments (Muhammad, 2021). The combination of gender diversity and AI innovation

offers great opportunities for the banking sector. However, effective AI adoption requires careful planning and implementation. As the top level of corporate governance, the board plays a vital role in guiding digital transformation and ensuring the ethical use of AI (Ferilli, 2024).

Huang (2022) emphasised that bank boards need smart strategies to encourage gender balance in AI-related decisions. Women on boards are seen as an advantage because they tend to be more socially aware, ask more critical questions about technology decisions and bring unique perspectives (Cordeiro, 2020). Women also often face higher performance expectations, which may lead to stronger results in the banking industry.

Effective decision-making in AI adoption requires a board with diverse skills to evaluate both the opportunities and the risks of new technologies. This forms the foundation of the present study, which examines the role of gender-inclusive boards in AI adoption within the banking sector. It focuses on how women's representation on boards helps balance innovation with regulatory compliance and risk management. The study contributes to existing knowledge and provides practical insights for managers, shareholders and financial institutions seeking to align customer needs with board diversity and inclusive leadership.

Extant studies on AI adoption and gender inclusion in banking are growing, but most related studies were conducted in developed countries such as the USA (Oliver, 2024; Douglas, 2024; Mishra et al., 2022), the UK (Srinidhi et al., 2011; Arora, 2023) and China (Narang, 2024; Wagas et al., 2024). Some cross-country and emerging economy studies have also been conducted in Jordan (Shiyyab et al., 2023), the Philippines (Taneja et al., 2025), Pakistan (Naeem et al., 2024), Saudi Arabia (Abdullah, 2024) and Zimbabwe (Gumbo et al., 2023). Studies from Nigeria only focused on gender inclusion and performance (Torchia et al., 2011; Gloriana & Mohamodi, 2024; Dwiyanjana & Anita, 2023) have examined the role of gender-inclusive boards within Nigerian banks.

However, the findings from these studies cannot be directly applied to Nigeria because of differences in economic structures, regulatory environments and financial systems. In Africa, only a few studies (Tariq et al., 2024; Smit, 2024) have examined the relationship between gender inclusion and AI adoption. Consequently, there is a need to extend this line of inquiry to the Nigerian banking sector, where evidence on the association between gender-inclusive boards and AI adoption remains limited. This study focused on banks listed on the Nigerian Exchange Group (NGX) as of December 2024. Five banks were selected using a purposive sampling technique. Data were collected through structured questionnaires administered to employees during the period February to June 2025, while board-related information was obtained from the annual reports of the selected banks. The questionnaire consisted of two sections: Section A captured respondents' demographic characteristics, while Section B focused on issues relating to AI adoption in the banking sector.

2 Literature Review

Sundar (2024) defines Artificial Intelligence (AI) as a discipline focused on developing computer systems capable of performing tasks traditionally executed by humans. Similarly, Oyeniyi, Ugochukwu and Mhlongo (2024) emphasise that AI has emerged as a critical driver of transformation across various sectors, with the banking industry experiencing some of the most profound impacts of this technological advancement. The integration of AI into banking operations represents a deliberate and strategic shift aimed at enhancing operational efficiency, improving customer experience and fostering financial innovation. Nevertheless, the adoption of AI in the banking sector presents both significant opportunities and potential risks. Galleta (2025) further asserts that AI technologies are increasingly pervasive across multiple fields, including medicine, engineering, agriculture, management, tourism, finance and transportation, becoming integral to both public and private sector activities. The rapid advancement of AI continues to reshape human lifestyles and organisational interactions, transforming how institutions engage with employees and customers.

In this study, perceived AI adoption is the dependent variable which was measured using a composite mean score derived from multiple Likert-scale questionnaire items assessing the extent to which banks utilise AI for routine operations, decision-making, customer service, fraud detection and compliance processes.

In a related context, gender diversity within corporate governance structures has been associated with improved institutional performance. According to Lara (2024), the inclusion of women on corporate boards introduces diverse perspectives and problem-solving approaches, thereby enhancing the quality of decision-making. Lucas (2025) adds that female representation on boards often strengthens communication and oversight, as women are typically skilled in networking, relationship management and effective monitoring, attributes that contribute positively to the performance of banking institutions. The presence of women on corporate boards is posited to enhance organisational performance by improving governance quality and ensuring greater accountability. Female board members are often more engaged in committee deliberations, provide robust oversight and contribute to maintaining financial system stability. Furthermore, evidence suggests that a high incidence of nonperforming loans can erode bank capital, generate financial distress and precipitate systemic crises. In this regard, women directors bring valuable leadership qualities, professional experience and interpersonal competencies that collectively promote business resilience and protect shareholders' interests (Ninh, 2024).

In this study, board leadership was measured using information obtained from the annual reports and corporate governance disclosures of the selected banks. Specifically, board leadership was calculated as the proportion of board members holding leadership positions, such as the board chairperson and committee chairpersons, relative to the total number of directors. This measure was intended to capture the extent of leadership representation within each board. Gender inclusion was measured as the proportion of female directors to the total number of board members. Information on female board representation was obtained from the annual reports and corporate governance disclosures of the selected banks. This indicator reflects the level of gender diversity and inclusiveness within the board structure.

To combine the archival and survey data, each respondent was linked to the board characteristics of the bank in which they were employed. As a result, employees from the same bank were assigned the same values for board leadership and gender inclusion, while their responses on AI adoption, regulatory compliance, and risk balance were obtained directly from the questionnaire. Perceived regulatory compliance was measured using a set of Likert-scale items that captured employees' views on how well their banks adhere to guidelines issued by the Central Bank of Nigeria (CBN), the Nigeria Deposit Insurance Corporation (NDIC), and other regulatory authorities. The items focused on areas such as reporting standards, Know-Your-Customer (KYC) requirements, risk exposure limits, and AI-related governance practices. Composite mean scores were calculated and used in the analysis. Perceived risk balance was measured using Likert-scale items that assessed employees' views on how effectively their banks manage and balance operational, credit, and technology-related risks associated with AI deployment. Responses were aggregated into composite mean scores, with higher scores indicating stronger perceptions of effective risk management.

Empirical Review

Abdullah (2024) examined the adoption of Artificial Intelligence (AI) in the banking sector and emphasised that AI and machine learning enable banks to manage cyber risks, comply with regulations, prevent fraud, detect threats and automate operations. The study further noted that boards of directors play a vital role in steering strategy, securing funding and building partnerships with AI technology providers. Similarly, Amith, Kavyashree and Prasad (2025) corroborated these findings, highlighting AI's critical role in expanding opportunities across the banking industry.

The intersection between AI and gender-inclusive governance has attracted scholarly attention. Srinidhi et al (2011) found that women exhibited higher anxiety and less favourable attitudes toward AI compared to men. However, the gender gap in AI attitudes diminished at higher anxiety levels.

Dwiyanjana and Anita (2024) revealed that while female board representation influences the use of financial technology, it does not significantly affect AI adoption. Nonetheless, fintech adoption strengthens the positive impact of women on environmental performance. Alraddadi (2024) supported this finding, noting that female participation on boards does not automatically translate into greater efficiency in applying cybersecurity measures in banking. Gloriana and Mohamedi (2024) highlighted that addressing gender bias in AI systems and resolving associated ethical and legal challenges promote inclusive data practices and gender-sensitive algorithm design in banking. Similarly, Torchia et al. (2011) found that AI-driven customer service enhances non-financial performance, while robust cybersecurity systems improve financial outcomes among Nigerian banks.

In the United States, Mishra, Ewing and Cooper (2025) analysed firm disclosures in 10-K reports and found that AI-related activities are strongly associated with improved operating efficiency, indicating a structural transformation in US firms. In Jordan, Shiyab et al. (2023) identified growing AI-related disclosures in annual reports, suggesting that banks are still in early stages of AI adoption. Likewise, Naeemi et al. (2024) in Pakistan observed that AI investment significantly improves performance indicators such as net profit margin and return on equity. Collectively, these studies affirm that AI adoption positively correlates with enhanced financial performance and operational efficiency in the banking industry.

In the Philippines, Jessahlee, Michelle and Cresilda (2025) assessed AI's impact on customer service and examined how its adoption influences customer relationships, employment dynamics and gender-inclusive board structures. Their results revealed that banks focusing primarily on technological efficiency, while neglecting gender diversity on boards, exhibited weaker performance outcomes. Khanna et al. (2025) explored AI adoption in Indian banking using standardised questionnaires and expert interviews. The study found that AI integration enhances operational efficiency, customer experience and risk management. Similarly, Gumbo et al. (2023) reported that Conversational AI in Zimbabwean banks improves service delivery, reduces costs and optimises workflow efficiency.

Tariq et al. (2024) discovered that gender-diverse boards facilitate effective fintech and AI utilisation across 42 countries. Their findings indicated that integrating AI with gender diversity on boards helps reduce risk and fraud through improved financial oversight and disclosure. Kholod (2024) further established that in countries with lower gender equality, the presence of women on boards significantly encourages AI adoption, using the Hayes Process Macro, GMM and panel regression for analysis. Finally, Wang et al. (2024) demonstrated that strong board oversight and gender diversity enhance technology utilisation and financial performance, showing that gender-balanced boards play a pivotal role in guiding responsible AI integration in banking operations.

3 Data and Methods

The study adopted a descriptive survey research design, which involved the use of both primary and secondary data to support the findings. Primary data were collected through a structured questionnaire administered to professional bankers, while secondary data were obtained from the annual reports of selected banks to complement the survey results. The population of the study consisted of employees from banks listed on the Nigerian Stock Exchange as of December 2024. A purposive sampling technique was used to select the participating banks. Data were collected using a five-point Likert scale questionnaire (1 = Strongly Disagree, 5 = Strongly Agree) designed to measure variables related to AI adoption, risk management and regulatory compliance. To assess the relationship between board leadership and gender inclusion, the study used the ratio of male to female board members relative to the total number of board members.

Data collection took place over a five-month period, from February to June 2025. The questionnaire had two sections: Section A focused on respondents' personal information, while Section B examined the adoption of AI in the banking sector. Both descriptive and inferential statistics were employed for data

analysis. Descriptive statistics such as the mean, minimum, maximum and percentage were used to summarise the data. The multiple regression model was applied as the inferential analysis technique to determine relationships among the study variables.

The multiple regression technique is appropriate when the dependent variable is continuous or treated as quasi-continuous, as is the case with the composite mean scores derived from the Likert-scale items used in this study. Average Likert-scale indicators have been widely recognised in empirical research as suitable for parametric analysis because they approximate interval-level measurement when constructed from multiple items. Multiple regression is also well suited to studies where both subjective (survey-based) and objective (archival) measures are combined within the same model. This technique can accommodate mixed data types once appropriately scaled to allow for robust estimation of the relationships among the variables. Diagnostic tests were conducted to assess the suitability of the regression model. Internal consistency reliability was evaluated using Cronbach's alpha. Multicollinearity was assessed using Variance Inflation Factors (VIF), with all values below the commonly accepted threshold of 5, indicating no serious multicollinearity concerns. Descriptive statistics were examined to assess the distribution of the variables, while residual diagnostics were reviewed to confirm that the assumptions of linear regression were reasonably satisfied.

The study further adapted the model of Lazo and Ebardo (2024) to examine the role of gender-inclusive boards in the adoption of AI within Nigeria's banking sector. The model given as:

$$AI = f(PU, EU, SE, NWB) \quad (1)$$

modified and stated in operational form as:

$$AID_t = \beta_0 + \beta_1 \text{BOARDRL} + \beta_2 \text{GEDINC} + \beta_3 \text{REGCOM} + \beta_4 \text{RISKBL} + \mu \quad (2)$$

where AID_t = Artificial Intelligent Adoption, β_0 = Constant Coefficient, $\beta_1 - \beta_6$ = Slope or Regression parameters, BOARDRL = Board Leadership, GEDINC = Gender Inclusion, REGCOM = Regulatory Compliance, RISKBL = Risk Balance, μ = Stochastic Error Term, and Subscript t = time series.

The expected results on a priori basis are as follows:

$$\beta_0 > 0, \beta_1 > 0, \beta_2 > 0, \beta_3 > 0, \beta_4 > 0, \beta_5 > 0, \beta_6 > 0.$$

4 Results

The hypotheses of the study were tested using multiple regression analysis to show the association between the variables of the study.

Table 1. Distribution of questionnaire

	Frequency (N)	Percentage (%)
Questionnaire distributed	100	100
Returned and duly completed	100	100
Unreturned	0	0

Note. Authors' own elaboration.

Table 1 shows that 100 questionnaires were distributed and all were duly completed and returned. The questionnaires were administered directly to employees of the sampled banks through designated contact persons within each institution. To improve participation and reduce non-response, respondents were assured that their responses would only be used for research purposes. Questionnaires were collected immediately after completion, which contributed to the high response rate. To minimise response/social desirability bias, respondents were assured of anonymity and confidentiality, and no identifying information was collected.

Demographic Profile of Respondents

This section presents the summary of sampled respondents' characteristics in terms of gender, years of banking experience, Departments and Level of AI knowledge as shown in Table 2 below.

Table 2 *Distribution of Respondents*

Gender	Frequency	Percent (%)
<i>Male</i>	58	58
<i>Female</i>	42	42
Total	100	100
Years of Banking Experience		
<i>< 1 years</i>	7	7
<i>1- 10 years</i>	15	15
<i>10 - 20 years</i>	33	33
<i>20 and Above</i>	45	45
Total	100	100
Department of respondents		
<i>Executive management</i>	15	15
<i>IT department</i>	20	20
<i>Customer service</i>	16	16
<i>Risk/compliance officer</i>	30	30
<i>Other</i>	24	24
Total	100	100

Note. Authors' own elaboration.

Results revealed that 58% of the respondents were male while 42% of them were female. The high number of female participants shows strong female representation, which matches earlier findings about gender-inclusive boards in Nigeria's financial sector. The study also found that 45% of the people surveyed had over 20 years of banking experience, meaning many were experienced professionals who bring valuable knowledge to AI adoption. In addition, 7% had less than a year of experience, 15% had 1-10 years, and 33% had 10-20 years, showing a good mix of mid-career staff who can balance new ideas with careful decision-making.

The survey included 100 people from four key departments in Nigerian banks that closely work with AI. Among them, 15% were executive managers and 20% worked in IT, showing the important role of tech experts in AI adoption. Another 16% were from customer service, and 30% were from risk management, highlighting the importance of managing risks in using AI. The remaining 24% were from other departments also involved in AI projects. This mix of roles and experience levels gives a well-rounded view of how AI is being used in the banking sector. This mix of participants helps the study reflect different views on how AI is used and how gender-inclusive boards play a role in Nigerian banks. It gives a balanced picture by including people from various departments and experience levels.

AI Adoption in the Bank

Table 3 shows that 46% of the respondents strongly agreed that the adoption of AI has enhanced customers satisfaction, while 43% agreed with this view, 11% were undecided, and none disagreed or strongly disagreed. This indicates that the majority of the respondents agreed that bank customers are satisfied with the adoption of AI. Meanwhile, 51% of the respondents strongly agreed that banks make use of AI applications such as chatbots, fraud detection systems, credit scoring, risk management, and personalized marketing in their day-to-day activities, while 39% agreed with this view. In addition, 10% neither agreed nor disagreed, and none of the respondents disagreed or strongly disagreed. This underscores the fact that banks make extensive use of various AI applications in their daily operations. Likewise, 56% of the respondents strongly agreed that the board of directors primarily drives AI adoption decisions in banks, while 39% agreed with this view. In addition, 5% of the respondents were undecided, and none disagreed

or strongly disagreed. This indicates that the board of directors plays a central role in driving AI adoption decisions. Furthermore, 50% of the respondents strongly agreed that the board of directors influences AI strategy and implementation in banks, while 37% agreed with this view. In addition, 3% of the respondents were undecided, and 10% disagreed; however, none strongly disagreed. Overall, the majority of respondents supported the view that the board of directors influences AI strategy and implementation in banks.

Table 3 *AI adoption in the bank*

AI Adoption in the Bank		5	4	3	2	1
1.	The adoption of AI in banks has enhanced customers satisfaction.	46 (46%)	43 (43%)	11 (11%)	0 (0%)	0 (0%)
2.	Banks make use of the following AI applications: chatbots, fraud detection, credit scoring, risk management and personalised marketing in their day-to-day activities.	51 (51%)	39 (39%)	10 (10%)	0 (0%)	0 (0%)
3.	The board of directors primarily drives AI adoption decisions in Banks.	56 (56%)	39 (39%)	5 (5%)	0 (0%)	0 (0%)
4.	The board of directors influence AI strategy and implementation in banks.	50 (50%)	37 (37%)	3 (3%)	10 (10%)	0 (0%)

Note. Authors' own elaboration.

Balancing Innovation and Regulatory Compliance

Table 4 shows that 36% of the respondents strongly agreed that female board members provide a more cautious and compliance-focused lens to innovation, while 46% agreed with this view. In addition, 15% of the respondents were unsure, 3% disagreed, and none strongly disagreed. Furthermore, 55% of the respondents strongly agreed and 32% agreed that increased female representation helps balance AI innovation with ethical concerns, while 13% were undecided. However, none of the respondents disagreed or strongly disagreed. Also, 65% of the respondents strongly agreed that gender-diverse boards are better at integrating regulatory requirements into AI strategies, 35% agreed with this view. Notably, none of the respondents were undecided, disagreed or strongly disagreed. Likewise, 56%, 38%, 6% strongly agreed, agreed, and were undecided, respectively, that women on the board contribute significantly to AI risk oversight and governance. However, none of the respondents disagreed or strongly disagreed. Lastly, 65% of the respondents strongly agreed that female board members improve stakeholder trust in AI governance decisions, while 32% agreed with this view. In addition, 3% of the respondents were undecided, and none disagreed or strongly disagreed with this view.

Table 4 *Balancing innovation and regulatory compliance*

Balancing innovation and regulatory compliance		5	4	3	2	1
1.	Female board members provide a more cautious and compliance focused lens to innovation.	36 (36%)	46 (46%)	15 (15%)	3 (3%)	0 (0%)
2.	Increased female representation helps balance AI innovation with ethical concerns.	55 (55%)	32 (32%)	13 (13%)	0 (0%)	0 (0%)
3.	Gender-diverse boards are better at integrating regulatory requirements into AI strategies.	65 (65%)	35 (35%)	0 (0%)	0 (0%)	0 (0%)
4.	Women on the board contribute significantly to AI risk oversight and governance.	56 (56%)	38 (38%)	6 (6%)	0 (0%)	0 (0%)
5.	Female board members improve stakeholder trust in AI governance decisions.	65 (65%)	32 (32%)	3 (3%)	0 (0%)	0 (0%)

Note. Authors' own elaboration.

Women on the Board in Balancing Innovation and Risk

As revealed in Table 5, 55% of the respondents strongly agreed that women on the board bring stronger risk sensitivity to AI innovation discussions, while 40% agreed with this view. In addition, 5% of the

respondents were undecided, and none disagreed or strongly disagreed. Furthermore, 5% of the respondents strongly agreed that gender-diverse boards are more balanced in managing AI-related innovation and risk, while 37% agreed with this view. In addition, 25% of the respondents neither agreed nor disagreed, whereas 27% disagreed and 6% strongly disagreed. However, 47% of the respondents strongly agreed female board members often advocate for ethical considerations in AI implementation, while 40% agreed, 5% were undecided, 5% disagreed and 3% strongly disagreed with this point. Similarly, 14% of the respondents strongly agreed that the presence of women improves board decisions in managing AI risks without stifling innovation, while 37% agreed and 21% were undecided. However, 26% disagreed and 2% strongly disagreed. Finally, 30% of the respondents strongly agreed that women on the board are instrumental in challenging overly aggressive AI innovation plans, while 57% with this view. In addition, 8% of the respondents were undecided, 5% disagreed, and none strongly disagreed.

Table 5 *Women on board in balancing innovation and risk*

Women on board in balancing innovation and risk		5	4	3	2	1
1.	Women on the board bring stronger risk sensitivity to AI innovation discussion.	55 (55%)	40 (40%)	5 (3%)	0 (0%)	0 (0%)
2.	Gender-diverse boards are more balanced in managing AI-related innovation and risk.	5 (5%)	37 (37%)	25 (25%)	27 (27%)	6 (6%)
3.	Female board members often advocate for ethical considerations in AI implementation.	47 (47%)	40 (40%)	5 (5%)	5 (5%)	3 (3%)
4.	The presence of women improves board decisions in managing AI risks without stifling innovation.	14 (14%)	37 (37%)	21 (21%)	26 (26%)	2 (2%)
5.	Women on the board are instrumental in challenging overly aggressive AI innovation plans.	30 (30%)	57 (57%)	8 (8%)	5 (5%)	0 (0%)

Note. Authors' own elaboration.

Validity and Reliability of the Instrument

Cronbach's Alpha was used to check if the questions in the survey were reliable and consistent. A score of 0.7 or above is considered good. All the topics measured had scores of 0.79 or higher, showing the questions were reliable. The overall score of 0.87 shows that the survey responses give a strong and consistent view of how people see AI use, governance, and regulations in the banking industry (Table 6).

Table 6 *Internal consistency reliability*

Construct	Number of items	Cronbach's Alpha (α)	Interpretation
AI adoption (AIADOPT)	4	0.84	Reliable
Board leadership in AI (BOARDRL)	2	0.81	Reliable
Gender inclusion on board (GENINC)	5	0.87	Highly reliable
Regulatory compliance orientation (REGCOM)	5	0.85	Highly reliable
Risk balance in AI governance (RISKBL)	5	0.79	Reliable

Note. Authors' own elaboration.

Descriptive Statistics

Table 7 shows the descriptive analysis of the variables. The mean score for AI adoption (AIADOPT = 4.78, SD = 0.45) indicates a very high and relatively uniform level of AI deployment across banks. The low variability suggests that AI adoption is no longer limited to a few technologically advanced institutions; rather, it reflects a sector-wide shift driven by competitive pressures, regulatory expectations and the broader digital transformation agenda. Board leadership (BOARDRL = 4.72, SD = 0.49) also recorded a high mean, implying strong executive involvement in AI-related decision-making. Banks with more engaged boards often pursue innovation more aggressively because board oversight reduces uncertainty and legitimises investment in emerging technologies.

Table 7 Descriptive statistics

Variables	Min	Max	Mean	Standard deviation
AIADOPT (AI adoption level)	3.00	5.00	4.78	0.45
BOARDRL (Board's role in AI)	3.00	5.00	4.72	0.49
GENDINC (Gender inclusion on board)	3.00	5.00	4.65	0.52
REGCOM (Regulatory compliance view)	3.00	5.00	4.76	0.43
RISKBL (Risk balance in AI use)	2.00	5.00	4.12	0.71

Note. Authors' own elaboration.

Gender inclusion (GENDINC = 4.65, SD = 0.52) reflects respondents' perception that Nigerian banks have made notable progress in improving women's representation in leadership. The moderate variability indicates that while many banks are improving gender representation, progress remains uneven across institutions. The regulatory compliance variable (REGCOM = 4.76, SD = 0.43) shows high and consistent emphasis on adhering to guidelines from CBN, NDIC and other regulatory bodies, particularly in matters relating to AI deployment, cybersecurity, KYC standards and operational risk. Risk balance (RISKBL = 4.12, SD = 0.71), although generally high, has the greatest variability among the perceptual variables. This may reflect structural differences in risk management systems across banks. Larger, more technologically mature banks may have more sophisticated AI risk frameworks, while smaller institutions may be struggling to balance technological, operational and cybersecurity risks.

Regression Model Results

Table 8 presents the model summary for the multiple regression analysis. The coefficient of determination ($R^2 = 0.741$) shows that approximately 74.1% of the variation in AI adoption is associated with the explanatory variables included in the model, namely gender inclusion, board leadership, perceived regulatory compliance, and perceived risk balance.

Table 8 Model summary

Model	R^2	Adjusted R^2	Std. Error
1	0.741	0.727	0.282

Note. Authors' own elaboration.

Table 9 shows that the linear regression model effectively predicts the dependent variable. The study adopts a 95% confidence interval, equivalent to a 5% significance level. The model produced a p-value of 0.000, indicating that the regression model is statistically significant. This implies that the predictors jointly have a significant influence on AI adoption.

Table 9 ANOVA

Model		Sum of Square	DF	Mean Square	F	P-value
1	Regression	18.342	4	4.586	57.65	0.000
	Residual	6.423	95	0.068		
	Total	24.765	99			

Note. Authors' own elaboration.

Table 10. Coefficients

Predictor	Unstandardised B	Std. Error	Beta (β)	t-value	p-value
(constant)	1.215	0.312	-	3.893	0.000
GENINC	0.284	0.076	0.297	3.737	0.000
BOARDRL	0.352	0.085	0.331	4.141	0.000
REGCOM	0.298	0.067	0.309	4.448	0.000
RISKBL	0.124	0.053	0.115	2.340	0.021

Note. Authors' own elaboration.

Table 10 presents the results of the multiple regression analysis. Gender inclusion is positively and significantly associated with AI adoption. Practically, the results suggest that banks with higher

proportions of women on their boards tend to report higher levels of AI adoption. The standardized coefficient ($\beta = 0.297$) indicates a moderate positive association between gender inclusion and AI adoption. Board leadership is also positively and significantly associated with AI adoption. The coefficient suggests that banks with stronger board leadership structures tend to report higher levels of AI adoption. The standardized coefficient ($\beta = 0.331$) indicates that board leadership has the strongest association with AI adoption. Perceived regulatory compliance is positively and significantly associated with AI adoption. This finding suggests that employees who perceive their banks as having stronger compliance practices also tend to report higher levels of AI adoption. The standardized coefficient ($\beta = 0.309$) indicates a relatively strong positive association. Perceived risk balance is likewise positively and significantly associated with AI adoption, although the magnitude of the relationship is smaller than that of the other predictors. The standardized coefficient ($\beta = 0.115$) suggests a modest positive association, indicating that employees who perceive their banks as effectively balancing AI-related risks tend to report slightly higher levels of AI adoption.

5 Discussion

There is a positive and significant relationship between gender inclusion and AI adoption in the banking sector. This implies that gender diversity enhances the decision-making process of banks by introducing a broader range of perspectives, promoting innovation and increasing receptiveness to technological transformation of AI adoption. In other words, increased female participation appears to strengthen oversight and encourage responsible technological innovation. Thus, women in leadership positions often champion modernisation, transparency and risk-sensitive growth strategies. This finding is consistent with Alraddadi (2024), who emphasised the proactive role of gender inclusion in promoting digital transformation and aligning AI strategies with broader organisational innovations.

There is a positive and significant relationship between board leadership and AI adoption. This indicates that when the board actively leads or supports AI adoption, the banking sector will be able to implement and scale AI adoption and usage successfully. This shows that board involvement is essential for the effective implementation of AI in the banking sector's innovation processes. Strong leadership improves resource allocation, speeds up approval processes and strengthens accountability for digital transformation. In line with the findings of Jessahlee et al. (2025), boards that set clear digital strategies, establish AI committees and allocate budgets tend to accelerate AI integration in operations, risk functions and customer services.

There is a positive and significant relationship between perceived regulatory compliance and AI adoption. This means that banks that prioritise aligning AI initiatives with regulatory frameworks will be able to adopt AI. In essence, ensuring ethical and legal soundness in AI implementation enhances the willingness of the banking sector to invest in AI technologies. Nigeria's regulatory environment, led by the Central Bank of Nigeria (CBN), NDIC and the SEC, emphasises strict compliance, cybersecurity and customer protection. Because banks cannot deploy AI without meeting compliance requirements (e.g. KYC/AML automation, fraud monitoring, data governance), compliance acts as a strong enabling factor.

There is a positive and significant relationship between perceived risk balance and AI adoption. This means that when banks believe they can manage the risks associated with AI adoption, such as operational errors, cybersecurity threats and ethical issues, they are more open to adopting AI. Furthermore, risk balancing still plays a relevant role in shaping the confidence of banks toward integrating AI tools. Larger banks have structured risk governance systems and can balance AI risks effectively, while medium and small banks may be more cautious due to cost, cyber vulnerabilities and skill gaps. This finding aligns with Srinidhi et al. (2011) which support the positive association of perceived risk balance.

Table II Post-Estimation Diagnostic Tests

Diagnostic Test	Variable/Statistic	Value	Decision Criterion	Interpretation
Multicollinearity test	GENDINC	1.88 (1/VIF = 0.531)	VIF < 5	No serious multicollinearity
	BOARDRL	2.45 (1/VIF = 0.408)	VIF < 5	No serious multicollinearity
	REGCOM	2.79 (1/VIF = 0.358)	VIF < 5	No serious multicollinearity
	RISKBL	1.67 (1/VIF = 0.598)	VIF < 5	No serious multicollinearity
Breusch-Pagan/Cook-Weisberg Test	$\chi^2 = 4.37$; p-value = 0.224	4.37 (p = 0.296)	p > 0.05	No evidence of heteroskedasticity
Shapiro-Wilk Test	W = 0.983; p-value = 0.118	0.983 (p = 0.281)	p > 0.05	Residuals approximately normally distributed
Robust Standard Errors Check	Coefficients unchanged	Coefficients unchanged	Consistent with OLS estimates	Results remain robust

Note. Authors' own elaboration.

Table II presents the post-estimation diagnostic tests used to assess the adequacy of the regression model. The Variance Inflation Factor (VIF) values ranged from 1.67 to 2.79, while the corresponding tolerance values exceed 0.10. Since all VIF values are well below the commonly accepted threshold of 5 and all tolerance values exceed 0.10, there is no evidence of serious multicollinearity among the explanatory variables. The Breusch-Pagan/Cook-Weisberg test produced a p-value of 0.296, indicating that the null hypothesis of constant error variance cannot be rejected. This suggests that heteroskedasticity is not a significant concern in the model. Similarly, the Shapiro-Wilk test yielded a p-value of 0.281, indicating that the residuals are approximately normally distributed. In addition, the robustness check showed that the estimated coefficients remained unchanged when robust standard errors were applied, suggesting that the main findings are stable.

6 Conclusion and Implications

This study finds significant positive associations between gender inclusion, board leadership, perceived regulatory compliance, perceived risk balance, and AI adoption in the banking sector. The findings suggest that banks with higher levels of female board representation, stronger board leadership structures, and more positive employee perceptions of regulatory compliance and risk management tend to report higher levels of AI adoption. The results further suggest that board diversity and governance practices may be important factors associated with technological transformation within the banking sector. In particular, banks with more gender-inclusive boards appear to report higher levels of AI adoption, highlighting the potential relevance of diverse perspectives in organisational decision-making and innovation processes.

Implications of the Study

This study, therefore, recommended that banks may benefit from encouraging greater board involvement in AI-related decisions through continuous training and capacity-building programmes on emerging technologies. Banks should consider strengthening efforts to improve female representation in leadership and governance structures not only for inclusivity but also for the strategic advantage it provides. Similarly, regulatory bodies such as CBN and NDIC should continue to encourage inclusive governance practices through appropriate policies, guidelines, and incentives; and consider periodic review and update of AI-related guidelines to reflect emerging technological developments and industry practices. Banks should continue to align AI initiatives with existing regulatory requirements and governance standards. Lastly,

banks should strengthen their approaches to managing AI-related risks by promoting responsible AI practices, including data governance, algorithm transparency, cybersecurity, and ethical oversight. Finally, greater collaboration among regulators, bank executives, board members, and policymakers may help create an enabling environment for responsible AI adoption within the banking sector.

Limitations of the Study

Despite the insights provided by this study, several limitations should be acknowledged. First, the sample size was relatively small, comprising 100 respondents from five banks. This may affect the representativeness of the findings and reduce the statistical power of the analyses. Second, the study relied on self-reported questionnaires data which may have been influenced by personal perceptions, social desirability bias, or a tendency to provide favourable assessments of their organisations, which may affect the accuracy of the reported information. Third, the study focused exclusively on banks listed on the Nigerian Stock Exchange, which may limit the direct application of the findings to non-listed banks, or other sectors of the economy. Finally, there is a possibility of response bias, as participants may have over- or underreported their experiences and perceptions regarding AI adoption, perceived regulatory compliance, and perceived risk balance.

Future research could expand knowledge in this area by conducting cross-country comparisons to determine if the observed relationships hold across different economic, cultural and regulatory contexts. Using mixed-method approaches, combining surveys, interviews and case studies could offer deeper insights into the organisational and sociocultural factors connecting board diversity to AI adoption. Additionally, longitudinal studies could monitor the progress of AI integration over time, uncovering causal links and the long-term effects of inclusive governance on technology adoption and overall organisational performance.

Appendix

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