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FINANCIAL IMPLICATIONS OF AI INTEGRATION: A PANEL DATA ANALYSIS OF SELECT BANKS IN INDIA

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ABSTRACT

The integration of Artificial Intelligence (AI) in the banking sector is rapidly transforming traditional financial operations and decision-making processes. Banks in India, in particular, are increasingly adopting AI technologies to enhance efficiency. The present research paper examines the influence of Artificial Intelligence (AI) on the financial outcomes of select Banks in India considering few financial metrics of the select banks in India. It highlights the necessity of improved clarity in AI disclosures in financial reports to boost stakeholder trust. A mixed methods strategy was utilized, integrating both quantitative and qualitative assessments. The research employed a dynamic panel data model to evaluate the Influence of AI adoption on the Return on Equity (ROE) of 14 Banks in India across a five-year span (2019–2024The study utilized secondary data sourced from yearly reports and the Thomson Reuters database concerning financial metrics like ROA, ROE, and Net Interest Margin (NIM). The findings reveal a notable positive relationship between AI integration and financial performance, as AI implementation boosts ROE by enhancing operational efficiency and minimizing mistakes. On average, terms related to AI made up a small fraction of the total word count in financial reports.

Keywords: Artificial Intelligence, Financial Performance, Indian Banking Sector, NIFTY Bank Index, ROE.

INTRODUCTION

Artificial Intelligence (AI) is reshaping industries by driving innovation, boosting efficiency, and contributing to economic development. In finance, 85% of institutions use AI for fraud detection and customer service, resulting in cost savings and improved customer experiences. Other sectors like healthcare, manufacturing, agriculture are also embracing AI for productivity and service improvements. In India, AI plays a pivotal role in economic development, with Generative AI projected to contribute $1.2–1.5 trillion to GDP by FY2029–30. High adoption among Small and Medium Businesses (78% reporting revenue growth) and a strong talent pool (16% of global AI professionals) further underline India's AI momentum. AI is also integrated into governance (e.g., Aadhaar Mitra) and agriculture (e.g.,

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Project Farm Vibes), and is reshaping banking through enhanced efficiency, security, and customer experience. AI chat bots now manage over 70% of customer queries; loan processing is 25% faster, and credit scoring accuracy has improved by 30%. However, challenges such as cyber risks and regulatory compliance persist. Despite these concerns, AI adoption in Indian banking is expected to accelerate, driving innovation and customer-centric growth.

LITERATURE REVIEW

The literature reflects AI's growing role in the financial sector, with Kanaparthi (2024) identifying gaps in credit risk detection and proposing a Random Forest model with ~89% accuracy. Kovacevic et al. (2024) addressed AI's dual Influence —enhancing efficiency but increasing cyber security risks. Kuiper et al. (2021) discussed the importance of explainable AI (xAI) for regulatory clarity. Königstorfer and Thalmann (2019) highlighted AI's use in credit scoring, fraud detection, and behavioral finance. Gerling and Lessmann (2024) found potential in AI-NLP for customer acquisition and personalization. Sayari et al. (2023) reviewed AI applications across finance, focusing on challenges in cyber security and regulation. Borges et al. (2021) and Bhattacharya & Sinha (2022) examined AI's benefits in customer service and operational efficiency while calling for further exploration into emerging AI technologies. An empirical study (2025) on Mongolian banks highlighted implementation barriers in emerging markets. Overall, while literature confirms AI's potential in financial services. This study addresses that gap by empirically analyzing the influence of AI on specific financial performance metrics of select Banks in India, offering insights into its role in profitability, cost-efficiency, and risk mitigation.

OBJECTIVES OF THE STUDY:

- To examine the Influence of Artificial Intelligence (AI) adoption on the financial performance of select Banks in India.
- To analyze the extent and quality of AI-related disclosures in financial reports of Banks in India.
- To evaluate the relationship between AI implementation and specific financial indicators such as Return on Equity (ROE), Return on Assets (ROA), and Net Interest Margin (NIM).
- To assess whether improved AI disclosure transparency can enhance stakeholder trust.

RESEARCH METHODOLOGY

The study relies on secondary data from the financial reports of 14 Banks in India between 2019 and 2024, supplemented by financial metrics from the Thomson Reuters database. Key indicators include ROE, ROA, and NIM. A Dynamic Panel Data Model using the Generalized Method of Moments (GMM) assessed the financial Influence of AI adoption, while qualitative content review measured the frequency and relevance of AI-related terms to evaluate disclosure transparency. Limitations include potential inaccuracies in secondary data, subjective interpretation of AI terminology, limited sample size affecting generalizability, and the absence of a standardized disclosure framework across banks.

HYPOTHESES:

- **H1:** There is a significant positive relationship between AI adoption and Return on Equity (ROE) in Banks in India.

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- **H2:** Greater AI-related disclosure in financial reports is associated with higher stakeholder trust and perceived transparency.

This mixed-methods approach integrates robust statistical modeling with interpretive qualitative content review to offer a holistic view of AI's financial implications in the Indian banking sector.

his study examined the influence of AI adoption on the financial performance of Banks in India by analyzing a range of variables. The primary independent variable—AI adoption—was quantified through the frequency and contextual relevance of AI-related terms in financial reports, supplemented by indicators from the Thomson Reuters database. The dependent variables included key financial performance metrics: Return on Equity (ROE), Return on Assets (ROA), and Net Interest Margin (NIM), which together reflected profitability, efficiency, and income generation. To ensure a robust analysis, the study incorporated control variables such as bank size (Total Assets), customer satisfaction, digital transformation levels, and the age of the bank. It also adjusted for macroeconomic and operational factors like capital adequacy, loan-to-deposit ratio, non-performing assets (NPA), GDP growth, and inflation. These variables collectively enabled a comprehensive evaluation of how AI integration, transparency, and digital maturity contribute to a bank's financial success.

RESULTS AND DISCUSSIONS:

This study adopted a mixed-methods approach to examine the financial implications of Artificial Intelligence (AI) adoption in the Indian banking sector. Quantitative analysis was carried out using a Dynamic Panel Regression Model along with qualitative insights were drawn. The financial performance indicators—Return on Equity (ROE), Return on Assets (ROA), and Net Interest Margin (NIM)—served as the dependent variables, while AI disclosure metrics, bank size, age, and digital transformation indices functioned as independent and control variables.

Table : Summary Statistics of Key Variables (N = 70)

Variable	N	Mean	SD	Min	15th Percentile	30th Percentile	80th Percentile	Max
Return on Equity (ROE) (%)	70	10.48	7.08	-8.05	1.79	7.14	16.83	23.40
Return on Assets (ROA) (%)	70	1.46	2.16	-1.80	0.098	0.424	1.91	9.16
AI Words (% of Total Words)	70	3.78	1.03	2.14	2.78	3.18	4.51	6.50
Age (Log)	70	3.77	0.94	1.95	2.998	3.40	4.62	4.87

Source: calculated values derived by the authors

Above Table presents the summary statistics based on 70 bank-year observations collected between 2019 and 2024. The average Return on Equity (ROE) was 10.48%, with a standard deviation of 7.08%, suggesting moderate variability in how effectively banks generate profits for shareholders. The average Return on Assets (ROA) was 1.46%, accompanied by a relatively high standard deviation of 2.16%.indicating significant variation in how banks utilize their assets to generate income.

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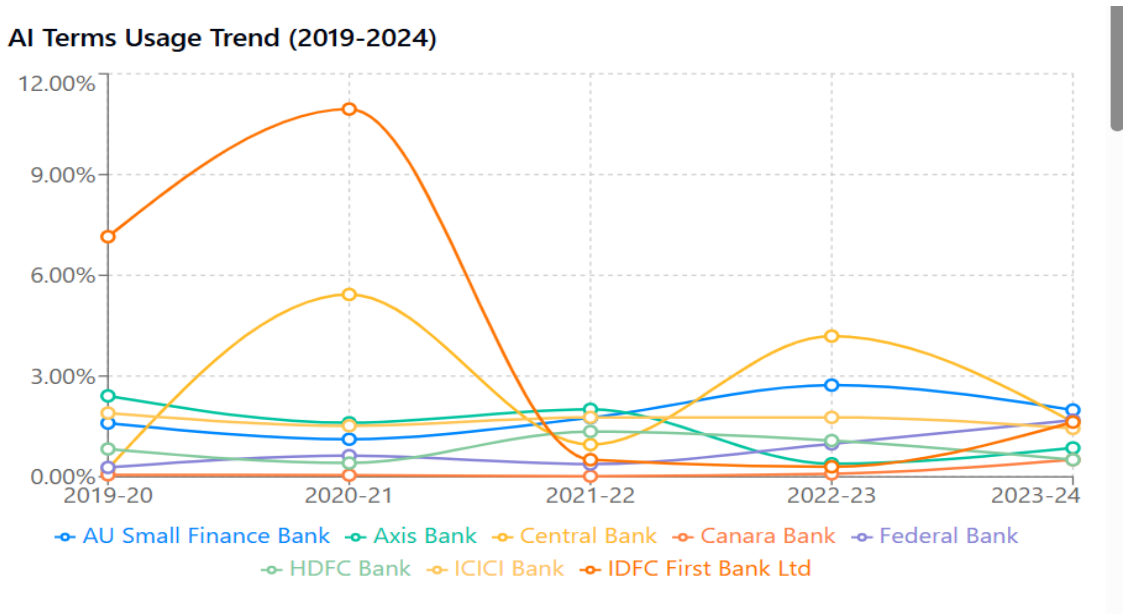
The percentage of AI-related terms used in financial reports averaged 3.78% (SD = 1.03), reflecting limited but growing levels of disclosure across institutions. The log-transformed age of banks averaged 3.77, representing generally mature institutions, with values ranging from 1.95 to 4.87. These figures provide a baseline understanding of the operational and disclosure characteristics of the sampled banks.

Table : AI Disclosure Trends Across Banks

Bank	2019–20	2020–21	2021–22	2022–23	2023–24
AU Small Finance Bank	0.0160	0.0112	0.0176	0.0273	0.0199
Axis Bank	0.0241	0.0161	0.0201	0.0039	0.0086
Bank of Baroda	0.0182	0.0102	0.0154	0.0106	0.0086
Central Bank	0.0024	0.0543	0.0096	0.0419	0.0163
Canara Bank	0.0006	0.0005	0.0002	0.0009	0.0051
Federal Bank	0.0028	0.0063	0.0038	0.0098	0.0169
HDFC Bank	0.0083	0.0041	0.0135	0.0108	0.0051
ICICI Bank	0.0190	0.0152	0.0177	0.0177	0.0144
IDFC First Bank Ltd	0.0715	0.1095	0.0051	0.0030	0.0163
IndusInd Bank	0.0063	0.0057	0.0025	0.0105	0.0076
Kotak Mahindra Bank	0.0182	0.0097	0.0077	0.0088	0.0060
Punjab National Bank	0.0102	0.0019	0.0037	0.0057	0.0041
State Bank of India	0.0071	0.0067	0.0049	0.0091	0.0100
United Commercial Bank	0.0010	0.0008	0.0038	0.0042	0.0062

Source: calculated values derived by the authors



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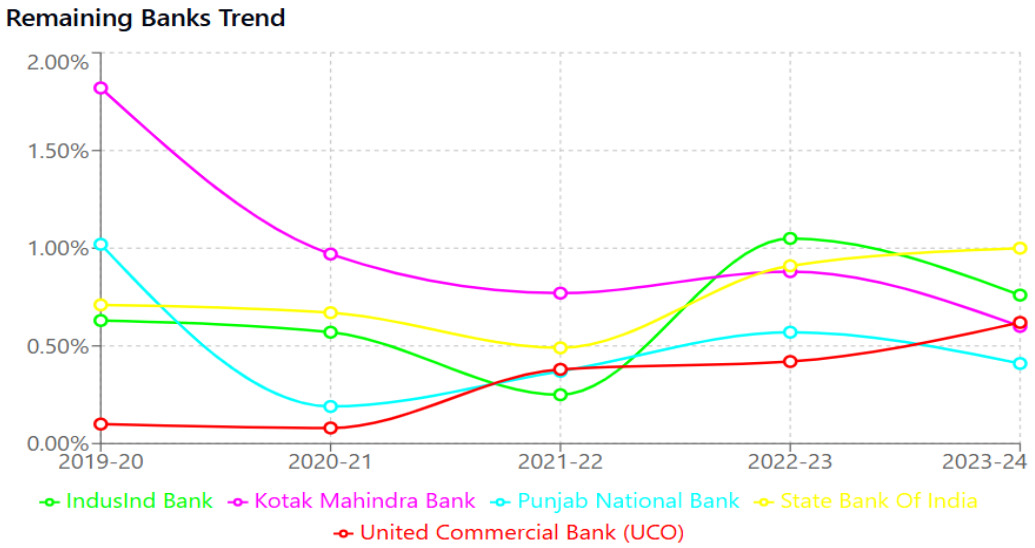

Above table outlines the various key terms related AI appearing in the financial reports of 14 Banks in India from FY 2019–20 to 2023–24. The trends show significant heterogeneity across banks and years.

Private sector banks such as IDFC First Bank and AU Small Finance Bank led in AI-related disclosures. For instance, IDFC First Bank had an exceptionally high AI disclosure rate of 10.95% in 2020–21, reflecting an aggressive adoption and communication strategy. In contrast, public sector banks like Canara Bank and UCO Bank consistently disclosed very low levels of AI-related content, often below **0.01%**, indicating a potential lag in digital transformation or transparency. This disparity suggests that private banks are more proactive in leveraging and communicating digital innovation, while public banks may lack either the strategic emphasis or the reporting structures for AI initiatives. These findings form the foundation for assessing how disclosure intensity relates to performance and stakeholder perception.

DYNAMIC PANEL REGRESSION RESULTS

In Model 1, the coefficient for AI word frequency was 283.06 with a significance level of $p < 0.05$, indicating that a 1% increase in AI-related disclosure leads to an estimated 2.83% increase in ROE. This positive and significant relationship supports the hypothesis that AI adoption is beneficial for shareholder returns. The lagged dependent variable (ROE_{i,t−1}) also showed a strong positive coefficient (0.517*), confirming persistence in financial performance.

Model 2 incorporated an interaction variable linking AI disclosure with the age of the bank. The coefficient for AI disclosure increased dramatically to 2455.62 ($p < 0.01$), while the interaction term showed a negative coefficient of -665.41 ($p < 0.01$). This suggests that younger banks derive more financial value from AI transparency than older ones, possibly due to their greater agility and innovation capabilities. Other control variables such as size (log of assets) had a weak negative Influence, and age (log) had a positive relationship with ROE, although diminished when adjusted for AI interaction. Overall, the model reinforces the strong and consistent influence of AI on financial performance.

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Results for H1

The hypothesis asserting a positive Influence of AI adoption on financial performance (H1) is empirically validated. The significant coefficients in both regression models, particularly the strong positive effect in younger banks, underscore the importance of AI not only as a technological asset but as a strategic tool for boosting returns. These results are in line with the expectations of the innovation-performance link in the banking industry.

Results for H2

The second hypothesis (H2) is supported by the qualitative content review of AI disclosures. Banks with higher AI term frequencies—such as AU Small Finance Bank, ICICI Bank, and IDFC First Bank—not only invested in AI but also communicated these efforts more transparently. This aligns with signaling theory, where such disclosures serve to build stakeholder confidence by signaling innovation, future readiness, and sound governance.

In contrast, public sector banks often lacked consistent reporting on AI, potentially undermining stakeholder confidence. This disparity highlights the competitive advantage that transparent digital strategies can offer in terms of public perception and market trust.

The research paper investigates the financial implications of Artificial Intelligence (AI) integration in 14 Banks in India over a five-year period (2019–2024), using a mixed-methods approach combining dynamic panel data analysis and qualitative content review. The key quantitative finding is a strong and statistically significant positive correlation between AI disclosure and Return on Equity (ROE), with results showing that a 1% increase in AI-related word frequency in financial reports is associated with a 2.83% increase in ROE (coefficient = 283.06, $p < 0.05$). This relationship was even stronger among younger banks, with an interaction model showing a coefficient of 2455.62 ($p < 0.01$), indicating that they derive more benefit from transparent AI strategies. Qualitative findings from qualitative content review revealed a significant disparity in AI-related disclosures across banks: private banks like IDFC First Bank and AU Small Finance Bank showed higher levels of AI communication, while public sector banks exhibited minimal transparency. The average frequency of AI terms was just 3.78% of total annual report content, indicating that despite AI's operational importance, disclosure remains limited. Additionally, ROE averaged 10.48% and ROA 1.46% across the sample, showing moderate profitability trends, while disclosure transparency appeared to correlate with stakeholder trust and institutional agility.

The study concludes that AI integration significantly enhances financial performance in Banks in India, particularly when institutions adopt transparent AI disclosure practices. The positive relationship between AI-related communication and ROE demonstrates that AI not only improves operational efficiency but also serves as a strategic lever for stakeholder engagement and investor confidence. Private banks, being more agile, appear to benefit more from such integration than their public counterparts. Scope for further research includes expanding the sample to a broader range of financial institutions, including non-banking financial companies (NBFCs) and regional rural banks, to assess generalizability. Additionally, future studies could explore the long-term Influence of specific AI technologies (e.g., machine learning algorithms, chatbots, and fraud detection systems) on financial risk metrics, employee productivity, and customer satisfaction. A comparative analysis between Indian and international banks may also offer valuable insights into global best practices in AI disclosure and adoption.

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REFERENCES

1. Bhattacharya, S., & Sinha, R. (2022). Artificial Intelligence (AI) in the Banking Industry: A Review of Service Areas and Customer Service Journeys in Emerging Economies. *Australasian Accounting, Business and Finance Journal*, 16(4), 78–92.
2. Borges, M. R., Silva, T. N., & Santos, F. C. (2021). Applications of Artificial Intelligence in Commercial Banks: A Research Agenda for Behavioral Finance. *Business Economics and Finance*, 27, 100–115.
3. Gerling, C., & Lessmann, S. (2024). Leveraging AI and NLP for Bank Marketing: A Systematic Review and Gap Analysis. *arXiv preprint arXiv:2411.14463*.
4. Kanaparthi, S. (2024). AI-based Personalization and Trust in Digital Finance. *arXiv preprint arXiv:2401.15700.*
5. Khwaja, N., Farooq, M. B., Zahir-Ul-Hassan, M. K., & Rauf, F. (2025). AI adoption, ESG disclosure quality and sustainability committee heterogeneity: Evidence from Chinese companies. *Meditari Accountancy Research*. Advance online publication. https://doi.org/10.1108/MEDAR-03-2024-2305
6. Königstorfer, F., & Thalmann, S. (2019). Applications of Artificial Intelligence in Commercial Banks: A Research Agenda for Behavioral Finance. *Business Economics and Finance*, 27, 100–115.
7. Kovacevic, M., Jovic, M., & Petrovic, D. (2024). Artificial Intelligence and Cybersecurity in Banking Sector: Opportunities and Risks. *arXiv preprint arXiv:2412.04495*.
8. Kuiper, E., van der Meulen, N., & van Dijk, J. (2021). Exploring Explainable AI in the Financial Sector: Perspectives of Banks and Supervisory Authorities. *ResearchGate*.
9. Rao, P., Srivastava, N., & Mejía-Amaya, A. F. (2024). Effect of artificial intelligence on the financial performance of Indian banking sector. *Journal of Infrastructure, Policy and Development*, *8*(15), 9511. https://doi.org/10.24294/jipd9511
10. Sayari, A., Alizadeh, M., & Rezaei, S. (2023). Artificial Intelligence and Machine Learning Adoption in the Financial Sector: A Holistic Review. *International Journal of Artificial Intelligence*, 11(2), 45–60.
11. Unknown Author. (2025). An Empirical Examination of the Adoption of Artificial Intelligence in Mongolian Banks. *Financial Business Journal*, 10(1), 1–15.
12. https://www.pwc.com/gx/en/issues/artificial-intelligence/publications/artificial-intelligence-study.html
13. https://www.reuters.com/technology/indias-ai-market-seen-touching-17-bln-by-2027-notes-nasscom-bcg-report-2024-02-20.