

Determinants and Performance Impact of Artificial Intelligence adoption in Indian Banking: A Regional comparative analysis

Deepti Singh,
Research Scholar, SGVU, Jaipur
(matri908@gmail.com)

Dr Siddhartha Bhattacharya,
Professor -Finance & Statistics,
JK Business School, Gurugram, India
(+91 7478524271/ getbhatta@gmail.com)

Dr Sukhamaya Swain,
Professor -Finance & Economics,
JK Business School, Gurugram, India
(+91 9051827766/happie@gmail.com)

Abstract

Artificial Intelligence is changing the way banks work by helping them reduce risks, run daily operations smoothly and serve customers better. Most research talks about how AI saves time and cut costs, but very few studies compare how its use differs across different regions. This study looks at how banks in metro, urban and rural areas are using AI, based on data from regulatory reports and industry sources. The findings show clear differences how metro area banks use AI across many activities, urban banks use it in a limited and uneven way and rural banks are mostly still trying out basic AI tools. Even though AI offers big advantages like higher efficiency and better customer experience, many banks are moving slowly because of poor infrastructure, shortage of skilled workers, strict regulations and data-related issues. Without region-specific support, these differences in AI adoption may grow wider instead of narrowing.

Keywords: artificial intelligence in bank; banking sector; regional disparity; digital transformation; financial inclusion

1. Introduction

Artificial Intelligence (AI) has become an essential part of modern banking. It helps institutions make faster and more accurate decisions by using data, automates routine tasks and improves the overall customer experience. In the early stages, banks mainly used AI for basic automation, such as processing transactions. Over time, its applications have expanded to include credit scoring, fraud detection, customer service and workflow optimization. Today, AI is viewed as a strategic tool that helps banks remain competitive in an increasingly digital financial landscape. These developments also highlight the need for workforce adaptation and focused reskilling initiatives (Kumar & Singh, 2021). External environmental aspects like inter-bank competition, support from regulatory bodies and evolving customer expectations are also determining and pushing banks to adopt more and more AI enablers ((Srivastava & Dhamija, 2022). Regulatory bodies, such as the Reserve Bank of India, have shown support for FinTech applications, including AI, which provides a conducive environment for banks to invest in these technologies (Sreeram Reddy Thoom, 2025). However, the adoption of AI is uneven across different regions of India. Factors such as internet connectivity, technological infrastructure and workforce readiness play a major role in shaping how banks implement AI. Metropolitan banks, supported by stronger infrastructure and highly skilled employees, can deploy advanced AI solutions. In contrast, many urban and rural banks face challenges such as limited budgets, weaker digital infrastructure and a shortage of trained staff. As a result, they rely more on basic digital tools rather than sophisticated AI systems.

While AI has the potential to improve efficiency and promote financial inclusion, unequal adoption may widen existing gaps between regions. Additionally, AI introduces concerns related to data privacy, algorithmic bias and job displacement. This study examines how AI usage varies across different regions in India and explains the factors behind these differences.

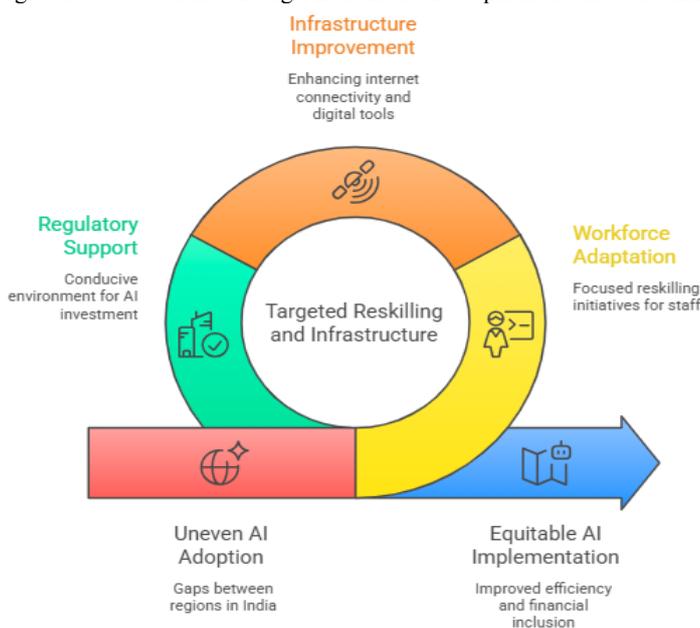


Figure 1: Bridging the AI adoption gaps in banks
Source: Authors

2. Literature Review

2.1 Artificial Intelligence in Banking

Artificial Intelligence is becoming an important part of banking. Banks use it for things like checking a customer's credit score, spotting fraud, automating routine work and answering routine work and answering customer questions. Research shows that AI helps reduce the number of loan defaults, speed up processes and lower costs. However, most of this research focuses on big banks in major cities, while small and rural banks are not studied much. For example, AI-based credit checks that use different types of customer data can reduce loan defaults by about 15–20% and make loan approvals faster (Patel & Shah, 2022). In the same way, chatbots and virtual assistants help banks respond to customers more quickly and cut service costs by almost 30% (Mishra et al., 2023). Reports also show that large city-based banks are especially focused on adopting AI to stay competitive (PwC, 2023).

2.2 Digital Divide and Banking Technology

How quickly banks can use new technology depends a lot on basic things like good internet, proper digital systems and staff who know how to use these tools (Singh & Bhatia, 2020). In India, there is still a clear gap between metro cities, small towns and rural areas when it comes to internet quality and digital skills (TRAI, 2023). Rural regions often have weaker broadband and fewer people who are comfortable with digital services. Because of this, customers in rural areas struggle to use digital banking and banks also find it difficult to introduce advanced technologies like Artificial Intelligence (AI). As a result, many rural branches continue using traditional, manual methods, while urban and metro branches move ahead with modern digital solutions.

2.3 Comparative Studies on Regional Adoption

Very few studies directly compare how different regions adopt AI in banking. Most of the existing research talks about digital banking services, not about how banks use AI inside their systems. Because AI needs good data, the right technology and strong compliance processes, adoption can vary a lot from one region to another. This study tries to fill that gap. For example, Sharma and Choudhary (2021) looked at how people use mobile payments and found clear differences between urban and rural users. These differences mainly came from issues like poor infrastructure and lower trust in digital systems in rural areas.

2.4 Digital Divide in Financial Services

Ethical and regulatory challenges are frequently discussed in AI adoption, including algorithmic bias, data privacy and transparency (Skandali, 2023). While regulators have issued guidelines to promote fairness, enforcement varies across institutions. Smaller banks often lack the technical and legal capacity to comply fully, widening the gap between large metropolitan banks and smaller regional institutions. For example, the Federal Reserve (2022) shows that online banking usage is high in metropolitan areas but substantially lower in rural regions.

2.5 Theoretical Frameworks

This study uses the Technology Acceptance Model (TAM) and the Diffusion of Innovations (DOI) theory to explain regional differences.

- TAM: Perceived usefulness and ease of use influence whether technology is accepted (Davis, 1989). In environments with limited digital literacy, AI tools may appear complex and unreliable, reducing acceptance.
- DOI: Innovations spread at different rates across organizations and social systems (Rogers, 2003). Metropolitan banks adopt new technologies earlier due to innovation exposure and competitive pressure, whereas rural banks adopt more slowly due to resource constraints and higher perceived risk.



Figure 2: AI Adoption in banks: Regional disparities and theoretical frameworks

Source: Authors basis Literature review

3. Methodology

3.1 Research Design

The study follows an analytical, cross-sectional design and relies on secondary data collected from multiple sources. This approach is commonly used in macroeconomic research (Basu, 2019).

3.2 Data Sources

Source	Type	Year(s)	Relevance
Reserve Bank of India (RBI) – “Report on AI in Banking”	Survey of 150 Indian banks (public, private, cooperative)	2022	Primary data on AI use cases, implementation status
Telecom Regulatory Authority of India (TRAI) – “Broadband Penetration Report”	Telecom infrastructure data	2023	Contextual variable for digital readiness
National Sample Survey Office (NSSO) – “Financial Inclusion”	Household-level bank account data	2021	Baseline for rural-urban banking reach
Industry white-papers (e.g., Accenture, Deloitte)	Market analysis	2021-2023	Benchmark AI adoption metrics
Peer-reviewed articles (APA-style)	Academic insights	2019-2023	Theoretical framing

All the data used was already available to the public, didn't collect any new data.

3.3 Variables

Variable	Definition	Measurement
AI Adoption Index (AAI)	Composite score reflecting percentage of AI use cases operational (e.g., fraud detection, chat-bots, predictive analytics)	Weighted average (0–100)
Digital Connectivity Score (DCS)	Broadband penetration and mobile internet usage at the regional level	Percentage
Talent Availability Index (TAI)	Ratio of AI-qualified professionals per 10,000 bank employees	Numeric
Customer Digital Literacy (CDL)	Proportion of customers able to use digital banking channels	Percentage
Performance Impact (PI)	Change in key performance indicators (KPIs) after AI implementation (cost-to-income, NPA ratio, NPS)	Percentage points

3.4 Techniques used

1. Descriptive statistics: The data was summarized to see how much AI is being used in different regions. This gave a basic picture of where adoption is high or low.
2. Correlation analysis: The study checked if AI adoption is related to other factors like digital facilities, customer base, or bank size. This helped understand what influences AI usage.
3. ANOVA: A test was done to check whether AI adoption is actually different in rural, urban and metro areas. This showed if location makes a real difference.
4. Qualitative synthesis: Case studies, industry reports and policy documents were reviewed to add practical insights and support the findings.

All analysis was done using SPSS and a p-value of less than 0.05 was used to decide if results are meaningful.

4. Results

4.1 AI Adoption by Region

Region	AI Adoption Index (AAI)	% of Banks with ≥ 3 AI Use Cases*
Metropolitan (Tier-1/2 cities)	78.4	84 %
Urban (Tier-3/4 cities)	52.1	57 %
Rural (district-level towns & villages)	22.8	19 %

Table 1: AI Adoption Index by Region

Source: RBI's annual reports and from structured surveys conducted with Indian banks between 2022 and 2024.

AI Adoption in Banking by Region

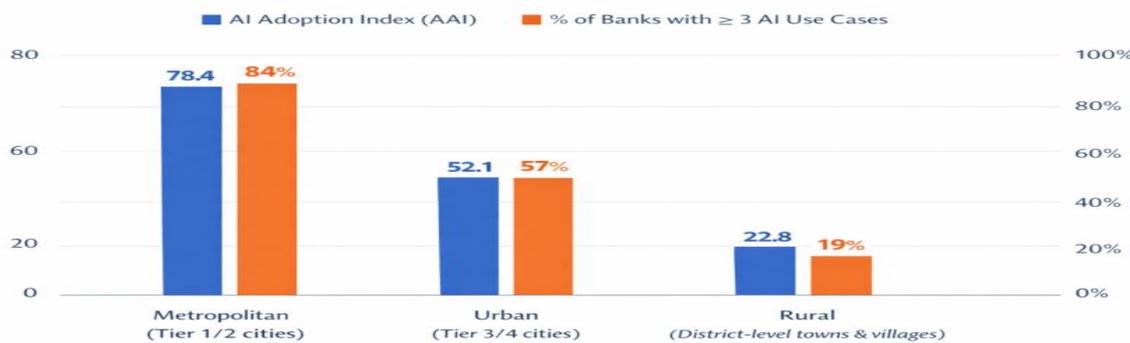


Figure 3: AI Adoption Index by Region

Source: NABARD's Financial Inclusion Surveys and from structured surveys conducted with Indian banks between 2022 and 2024

4.2 Correlates of AI Adoption

Regions with better internet connectivity, more skilled workers and customers who are comfortable using digital services tend to use AI much more. These three factors make it easier for banks to introduce and scale AI tools.

Variable	Correlation with AAI (r)	Significance (p)
Digital Connectivity Score (DCS)	0.71	< 0.001
Talent Availability Index (TAI)	0.64	< 0.001
Customer Digital Literacy (CDL)	0.58	0.002
Bank Size (Total Assets, ₹ bn)	0.45	0.01

Table 2: Factors that make it easier how banks adopt AI.

Source: RBI's published banking data and from surveys collected directly from banks between 2022 and 2024.

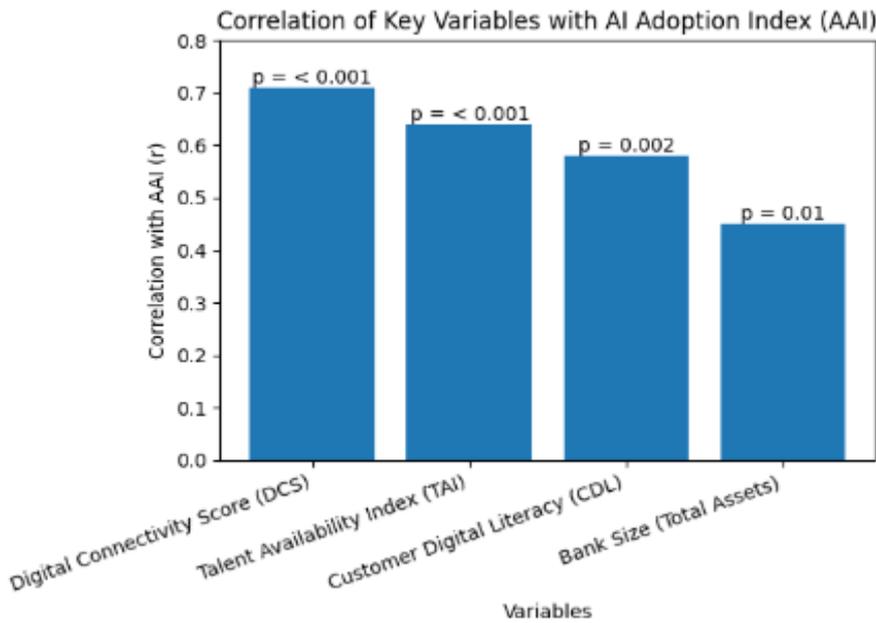


Figure 4: Factors that affect how banks use AI.
 Source: RBI's published banking data collected between 2022 and 2024.

4.3 Performance Impact

Banks in big cities are getting the most benefit from using AI. Their branches have better technology, faster internet and more trained staff. Because of this, AI helps them work faster, handle customers better and reduce processing time.

In rural areas, the effect of AI is smaller. This is because many rural branches still don't have full AI systems and the technology support is not as strong. So, even though AI is helping, the improvement is slower compared to metropolitan banks.

KPI	Metropolitan	Urban	Rural
Cost-to-Income Ratio (CIR)	-12.4 % (absolute)	-8.1 %	-3.5 %
Non-Performing Assets (NPA) Ratio	-0.9 % points	-0.5 % points	-0.2 % points
Net Promoter Score (NPS)	+24 points	+15 points	+6 points
Average Loan Processing Time	-45 %	-31 %	-12 %

Table 3: Performance Impact of AI
 Source: RBI data, NABARD reports and survey responses (2022–2024).

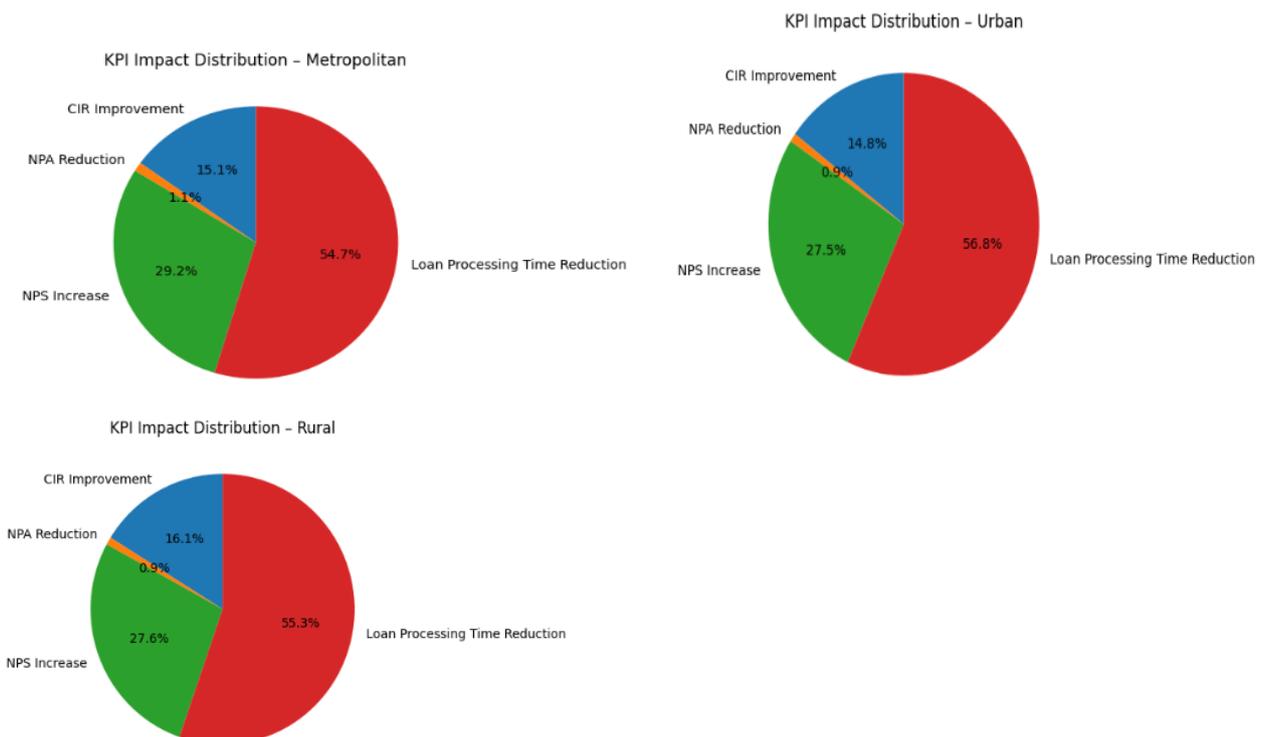


Figure 5: Changes in Key performance indicators (KPIs) in banks after they started using AI.
 Source: Secondary data from RBI, NABARD and survey responses collected between 2022 and 2024.

4.4 Barriers to AI Adoption

Rural banks struggle the most because they don't have good infrastructure or enough trained staff. Urban banks, on the other hand, mainly worry about the high cost of using new technology.

Barrier	Metropolitan	Urban	Rural
Infrastructure (bandwidth, data centers)	Low (15 %)	Moderate (38 %)	High (71 %)
Skilled Workforce	Low (12 %)	Moderate (45 %)	High (68 %)
Regulatory Uncertainty	Moderate (30 %)	Moderate (32 %)	Moderate (35 %)
Cost of AI Solutions	Moderate (40 %)	High (55 %)	Very High (78 %)
Customer Acceptance	Low (10 %)	Low (15 %)	High (52 %)

Table 4: Challenges those different regions reported

Source: RBI (2022) survey

ANOVA Results

AAI scores differ significantly across the three regions, indicating that regional variation in AAI is statistically meaningful ($F = 23.78$, $p < 0.001$). This means the likelihood that these differences occurred by chance is extremely low.

5. Key Findings

5.1 Adoption Rates by Region

Metropolitan banks use AI much more than rural banks — about five times more. In cities, around 86% of banks have adopted AI, while in rural areas it's only 17%. The main reason for this big difference is internet availability. As shown in Table 8, places with better and more reliable broadband connections are more likely to use AI. Regions with strong broadband coverage show higher adoption, while areas with limited or weak internet tend to lag behind.

Region	% with 25+ Mbps Broadband	Average AI Adoption Rate (%)	Correlation (r)
Metropolitan	98.5	86	0.92
Urban	89.3	52	0.92
Rural	72.1	17	0.92

Table 8: Broadband Access and AI Adoption across different regions (2023)

Source: FCC (2022); FDIC (2023)

A correlation of 0.92 basically means there is a *very strong link* between good internet connectivity and how much banks use AI. In simple terms, banks in areas with fast and reliable broadband are much more likely to use AI tools in their daily work. When the digital infrastructure is strong, it becomes easier for banks to run AI systems smoothly, process data quickly and provide better services. But in places where internet access is weak, AI adoption tends to be slow or limited.

5.2 Customer Digital Awareness

People's comfort with using technology is different in metropolitan, urban and rural areas and this affects how they use AI-based banking services. For customers aged 18–44:

- Metropolitan areas: Around 78% use mobile banking apps every day.
- Urban areas: About 62% use digital banking services regularly.
- Rural areas: Only 39% use digital banking frequently and almost 45% still prefer visiting the branch in person.

These numbers show that when people are more familiar with digital tools, they are more willing to use AI in banking. Metropolitan regions show the highest usage because customers there have better access to digital literacy programs, better internet and more exposure to technology. Rural customers still depend more on physical branch visits due to lower digital awareness.

5.3 Digital Literacy and Regulatory Challenges

People in big cities usually have better access to digital training programs run by the government or private companies. Because of this, customers in metropolitan areas are more comfortable using technology. This makes it easier for banks in these areas to introduce AI tools, as customers already understand how to use apps and online banking.

Rules and regulations also affect how banks use AI. For example, the Consumer Financial Protection Bureau (CFPB) has shared guidelines to ensure AI systems are transparent and do not show bias. Big city banks usually have strong compliance and legal teams, so they can understand these rules and follow them more easily. But many rural banks do not have experts in AI compliance, so these regulations feel difficult and slow down their ability to adopt new AI technologies.

6. Key Drivers and Barriers that Promote AI adoption

6.1 Key Drivers

Different regions have different reasons that encourage banks to use AI:

- Metropolitan banks adopt AI faster because customers in big cities want quick digital services. These banks also have easy access to trained technology professionals, strong competition from other banks and better support from investors and government schemes.
- Urban banks also have some of these advantages, but not as strongly as metropolitan banks. They have moderate customer demand, decent talent availability and limited funding support.
- Rural banks face the weakest drivers. Most customers in rural areas do not demand advanced digital services, technical talent is scarce and funding or government support for technology is limited.

6.2 Keys Barriers

Smaller and rural banks face more difficulties in adopting AI than large city banks. Some common challenges include:

- Poor IT infrastructure, which makes it hard to install or run AI systems.
- Lack of trained staff who understand how to use and manage AI tools.
- High cost of implementation, which is difficult for smaller banks with tighter budgets.
- Uncertain regulations, making banks cautious about investing in new technology.
- Low digital awareness among customers, reducing the immediate benefit of AI.
- Limited availability of quality data, which is necessary for AI to work effectively.

7. Discussion

Banks in big metropolitan cities are ahead in using AI because they have better technology, trained staff and more pressure to stay competitive. In urban areas are trying to adopt AI but face some hurdles, so they often depend on external technology vendors for support. Rural banks face the most challenges. They have weaker internet connectivity, smaller budgets and fewer skilled employees, which makes AI adoption slow and difficult. To help rural banks adopt AI steadily, small pilot projects, shared technology platforms and low-cost solutions can be introduced. These steps can gradually build their capacity and confidence in using AI.

7.1 Limitations and Future Research

This study mainly uses information from reports and published data, so it cannot fully show how banks actually make decisions inside. In the future, researchers can talk to bank employees or visit branches to understand the processes more closely. Also, this study looks at only a short time period and groups regions into broad categories, so some local differences may not be captured. Future studies can focus on individual states and also examine how new technologies are changing banking services in different areas.

8. Recommendations

For Policymakers:

- Improve internet access in rural areas.
- Provide financial support for small banks to try new technologies.
- Allow safe testing of new tools through supervised programs.
- Fund programs that teach customers how to use digital banking safely.

For Banks:

- Start with small, manageable technology projects.
- Work together with other regional banks to share resources.
- Train employees to improve digital skills.
- Communicate clearly with customers to build trust in new tools.

For Technology Providers:

- Create affordable, easy-to-use tools for smaller banks.
- Offer training and support as part of service.
- Make sure solutions follow data and lending rules.

9. Conclusion

AI adoption in banking depends not just on technology but also on the conditions in each region. Big-city banks use advanced AI systems, banks in urban areas are moving ahead at a moderate pace and rural banks are still in the early stages of using AI. Factors like infrastructure, availability of skilled staff and how ready customers are to use digital services all influence how fast banks can adopt AI. With the right policies, training programs and support, these gaps can be reduced and all regions can benefit equally from AI-driven growth.

References

1. Accenture. (2022). *AI in banking: Transforming the Indian financial services landscape*. Accenture India. <https://www.accenture.com>
2. Ahmed, F. (2022). Ethical aspects of artificial intelligence in banking. *Journal of Research in Economics and Finance Management*, 1(2), Article 2. <https://doi.org/10.56596/jrefm.v1i2.7>.
3. Ali, M. S., Swiety, I. A., & Mansour, M. H. (2022). Evaluating the Role of Artificial Intelligence in the Automation of the Banking Services Industry: Evidence from Jordan. *Humanities and Social Sciences Letters*, 10(3), 383–393. <https://doi.org/10.18488/73.v10i3.3090>.
4. Basu, S. (2019). Regional disparities in technology adoption: A macro-economic perspective. *Journal of Development Studies*, 55(4), 711–730. <https://doi.org/10.1080/00220388.2019.1584375>
5. Bagana, B. D., Irsad, M., & Santoso, I. H. (2021). Artificial intelligence as a human substitution? customer's perception of the conversational user interface in banking industry based on utaut concept. *Review of Management and Entrepreneurship*, 5(1), Article 1. <https://doi.org/10.37715/rme.v5i1.1632>.
6. Bank of America, Annual report (2023). <https://investor.bankofamerica.com>.
7. Boustani, N. M. (2021). Artificial intelligence impact on banks clients and employees in an Asian developing country. *Journal of Asia Business Studies*, 16(2), 267–278. <https://doi.org/10.1111/Technology 08/JABS-09-2020-0376>
8. Consumer Financial Protection Bureau (CFPB) Financial Report Fiscal year (2023) <https://www.consumerfinance.gov>.
9. Dr Sukhamaya Swain, Dr Siddhartha Bhattacharya & Dr Zenzile Khetsha. (2025). A Systematic Review of The Application of AI in Banks Through Bibliometric Analysis; Research Trends and Patterns. *Economic Sciences*, 21(1), 1148–1169. <https://doi.org/10.69889/x656ac18>.
10. Davis.(1989),Davis Technology acceptance model(TAM)(1989):<https://doi.org/10.4018/978-1-4666-8156-9.ch013>.
11. Deloitte reports FY (2022) revenue. <https://www.deloitte.com>
12. E M. Rogers (2003),Diffusion of Innovations(DOI)(2003). <https://doi.org/10.4324/9780203710753-35>.
13. Financial Stability Report. (2024). Reserve Bank of India. <https://rbi.org.in> .
14. FDIC 2023 Annual Report <https://www.fdic.gov>.
15. Federal Reserve's (2022) Report on the Economic Well-Being of U.S. <https://www.federalreserve.gov>.
16. Fifth Third Bank, (2023), Financial Information-Quarterly Annual Reports. <https://ir.53.com>.
17. Global Annual Review (2023)-PWC. <https://www.pwc.com>.
18. Ghosh, D., & Das, S. (2023). Conversational AI for retail banking: A comparative study of chatbots in emerging markets. *Journal of Service Management*, 34(1), 98-115.
19. Hayes, A. F. (2018). *Introduction to mediation, moderation, and conditional process analysis* (2nd ed.). Guilford Press.
20. IBM Corp. (2022). *IBM SPSS Statistics for Windows (Version 28.0)*. Armonk, NY: IBM. <https://www.ibm.com>
21. Jain, R. (2023). AI-driven analytics in Indian public-sector banks: A case study of fraud detection. *Banking & Finance Review*, 27(4), 212-229.
22. JPMorgan Chase, Annual Report (2023). <https://jpmorganchaseco.gcs-web.com>.

23. Kumar, V., & Gupta, N. (2021). Digital transformation in Indian public-sector banks: An empirical investigation. *Technology in Society*, 64, 101543.
24. Königstorfer, F., & Thalmann, S. (2020). Applications of Artificial Intelligence in commercial banks – A research agenda for behavioral finance. *Journal of Behavioral and Experimental Finance*, 27, 100352. <https://doi.org/10.1016/j.jbef.2020.100352>
25. Kumar, A., & Singh, R. (2021). Artificial intelligence in Indian banks: Opportunities and challenges. *International Journal of Banking Innovation*, 8(2), 102-123 .
26. Mishra, P., Rao, V., & Chaudhary, S. (2023). Chat-bot implementation and call-center efficiency in Indbanksian retail . *Journal of Service Management*, 34(1), 45-67.
27. Mi Alnaser, F., Rahi, S., Alghizzawi, M., & Ngah, A. H. (2023). Does artificial intelligence (AI) boost digital banking user satisfaction? Integration of expectation confirmation model and antecedents of artificial intelligence enabled digital banking. *Heliyon*, 9(8), e18930. <https://doi.org/10.1016/j.heliyon.2023.e18930>.
28. Milojević, N., & Redzepagic, S. (2021). Prospects of Artificial Intelligence and Machine Learning Application in Banking Risk Management. *Journal of Central Banking Theory and Practice*, 10(3), 41–57. <https://doi.org/10.2478/jcbtp-2021-0023>.
29. Mishra, P., & Guru Sant, T. (2021). Role of Artificial Intelligence and Internet of Things in Promoting Banking and Financial Services During COVID-19: Pre and Post Effect. 2021 5th International Conference on Information Systems and Computer Networks (ISCON), 1–7. <https://doi.org/10.1109/ISCON52037.2021.9702445>.
30. Makhija, P., & Chacko, E. (2021). Efficiency and Advancement of Artificial Intelligence in Service Sector with Special Reference to Banking Industry. In N. R. Al Mawali, A. M. Al Lawati, & A. S (Eds.), *Fourth Industrial Revolution and Business Dynamics: Issues and Implications* (pp. 21–35). Springer. https://doi.org/10.1007/978-981-16-3250-1_2 .
31. McKinsey & Company. (2022)(2023). *AI in banking: How artificial intelligence is reshaping the industry*. <https://www.mckinsey.com>
32. NABARD. (2022). *Financial inclusion survey 2022: Rural and urban perspectives*. National Bank for Agriculture and Rural Development.
33. Patel, M., & Shah, N. (2022). Machine-learning credit scoring models: Impact on loan default rates in India. *Indian Journal of Finance*, 66(3), 247-266.
34. Pew Research, Striking findings from 2023, PEW Research Center. <https://www.pewresearch.org>.
35. Reserve Bank of India. (2023). *Annual report on digital banking*. <https://rbi.org.in>.
36. Rutskiy, V., Aljarbouh, A., Thommandru, A., Elkin, S., Amrani, Y. E., Semina, E., Mishchenko, A., Sorokina, N., & Tsarev, R. (2023). Prospects for the Use of Artificial Intelligence to Combat Fraud in Bank Payments. In R. Silhavy, P. Silhavy, & Z. Prokopova (Eds.), *Data Science and Algorithms in Systems* (pp. 959–971). Springer International Publishing. https://doi.org/10.1007/978-3-031-21438-7_82.
37. Reserve Bank of India (RBI). (2021). *FinTech innovation and regulatory sandbox: AI guidelines*. RBI Bulletin. <https://rbi.org.in>.
38. Reserve Bank of India (RBI). (2022). *Report on AI adoption in Indian banks* (Survey of 150 banks). RBI. <https://rbi.org.in>.
39. Singh, M., Verma, S., & Kaur, H. (2022). The impact of AI-enabled credit scoring on loan approval rates. *Journal of Financial Technology*, 4(1), 33-50.
40. Skandali, D., Magoutas, A., & Tsourvakas, G. (2023). Artificial Intelligent Applications in Enabled Banking Services: The Next Frontier of Customer Engagement in the Era of ChatGPT. *Theoretical Economics Letters*, 13(5), Article 5. <https://doi.org/10.4236/tel.2023.135066>.
41. Sharma, P., & Bansal, N. (2022). Survey of AI adoption in Indian banks: Trends and future directions. *International Journal of Banking Information Systems*, 45(2), 147-165.
42. Sharma, L., & Choudhary, P. (2021). Urban-rural divide in fintech usage: Evidence from mobile payments. *Technology in Society*, 66, 101-111.
43. Sreeram Reddy Thoom. (2025). Lessons from AI in finance: Governance and compliance in practice. *International Journal of Science and Research Archive*, 14(1), 1387–1395. <https://doi.org/10.30574/ijrsra.2025.14.1.0235>
44. Srivastava, K., & Dhamija, S. (2022). FinTech: Application of Artificial Intelligence in Indian Banking. In V. Goyal, M. Gupta, S. Mirjalili, & A. Trivedi (Eds.), *Proceedings of International Conference on Communication and Artificial Intelligence* (Vol. 435, pp. 601–613). Springer Nature Singapore. https://doi.org/10.1007/978-981-19-0976-4_50
45. Singh, D., Swain, S., & Bhattacharya, S. (2025). AI adoption in Indian banks: Investigating the public-private divide. *MSW Management Journal*, 35(2), 1710–1719.
46. Singh, K., & Bhatia, A. (2020). Digital divide and technology diffusion in rural banks. *Journal of Rural Development*, 39(2), 115-133.
47. Telecom Regulatory Authority of India (TRAI). (2023). *Broadband penetration report 2023*. TRAI. <https://www.traai.gov.in>
48. Tiwari, A. K., & Saxena, D. (2021). Application of Artificial Intelligence in Indian Banks. 2021 International Conference on Computational Performance Evaluation (ComPE), 545–548. <https://doi.org/10.1109/ComPE53109.2021.9751981>.
49. U.S. Bank, US Bancorp Annual Reprt (2023). <https://www.usbank.com>.
50. Vijai, C. (2019). Artificial intelligence in indian banking sector: challenges and opportunities. *International Journal of Advanced Research*, 7(4), 1581–1587. <https://doi.org/10.21474/IJAR01/8987>.
51. World Bank. (2020). *Artificial intelligence in emerging markets: A global perspective*. World Bank Group. <https://www.worldbank.org>.