



The Role Of Artificial Intelligence In Financial Inclusion: Impact On Financial Services With Special Reference To Public Sector Banks In Maharashtra.

Shailesh Mukadam¹, Dr. Neha Choudhary², Dr. Bhawana Sharma³.

¹PhD Scholar, Amity Business School, Amity University, Mumbai.

²Assistant Professor, Amity Business School, Amity University, Mumbai.

³HOD Management, Amity Business School, Amity University, Mumbai.

Abstract

This Paper explores the transformative role of Artificial Intelligence (AI) in advancing financial inclusion, with a specific focus on Public Sector Banks (PSBs) in Maharashtra, India. Despite notable progress through initiatives like the Pradhan Mantri Jan Dhan Yojana (PMJDY), substantial gaps remain in credit accessibility, insurance penetration, and financial literacy. The integration of AI—through machine learning, chatbots, biometric authentication, and alternative credit scoring—has the potential to enhance outreach, operational efficiency, and customer engagement, especially in underserved rural and semi-urban areas. However, challenges such as algorithmic bias, data privacy concerns, legacy infrastructure, and digital illiteracy hinder the inclusive deployment of AI. The review highlights key research gaps, evaluates AI's application in PSBs, and recommends ethical and policy frameworks to ensure AI-driven financial systems are inclusive, transparent, and effective.

Keywords

Artificial Intelligence, Financial Inclusion, Public Sector Banks, Maharashtra, Digital Banking, Alternative Credit Scoring, Financial Literacy, Algorithmic Bias, Biometric Authentication, Inclusive Finance, Chatbots, Rural Banking, Ethical AI, Financial Technology (FinTech)

1. Definition of Financial Inclusion

Financial inclusion is the mechanism of ensuring provision of access to right financial products and services desired by people and enterprises at affordable prices in an transparent way. Almost 76% of the adults of the world have access to a bank account now, according to the World Bank (2022), yet persistent differences still exist—especially among emerging economies and for vulnerable communities. India has better access to banking facilities under Pradhan Mantri Jan Dhan Yojana (PMJDY) but lacks accessibility of credit, insurance coverage, and financial inclusion (Reserve Bank of India, 2021).

Understanding Financial Inclusion and Global Trends

Financial inclusion includes not only the presence of financial services but also their accessibility, affordability, and quality, particularly for disadvantaged groups. The World Bank (2022) reports that nearly 76% of the global adult population today has a bank account, a remarkable improvement in global financial inclusion over the last decade. But this figure conceals wide differences across regions, income levels, and gender. Low-income and fragile economies are still subject to structural hindrances like the absence of financial literacy, weak digital infrastructure, and socio-economic exclusion that preclude effective access to finance (Demirgüç-Kunt et al., 2022). Furthermore, although fintech innovations have improved in terms of reaching remote consumers, their success is still narrow without concurrent advancement in policy enablers and digital literacy. Financial inclusion has become the bedrock of fair economic growth, making available to people and businesses suitable and affordable financial services and products. According to the World Bank (2022), almost 76% of the world's adult population now holds a bank account, with significant gains in outreach registered. But disparities persist—particularly in poor and fragile economies—owing to constraints such as digital illiteracy, poor infrastructure, and socio-economic exclusion (Demirgüç-Kunt et al., 2022). Genuine financial inclusion goes beyond account ownership; it involves access to services, their affordability, and quality, especially for the underprivileged.

The Indian Context and the Role of PMJDY

India has registered notable progress in deepening financial inclusion by schemes like the Pradhan Mantri Jan Dhan Yojana (PMJDY) initiated in 2014 with the aim to extend universal access to banking by opening zero-balance accounts to the unbanked segments. According to government data, more than 480 million bank accounts have been opened under PMJDY till 2023, leading to a spurt in account holding among rural and poor people (Government of India, 2023). Though this is an achievement, effective financial inclusion entails more than account holding—it also needs to incorporate frequent usage, credit availability, micro-insurance schemes, pension access, and financial empowerment. As per the Reserve Bank of India (2021), issues like poor credit access for micro and small businesses, low rural insurance penetration, and the digital financial services gender gap remain impediments to inclusive growth. This points out that although structural enhancements in banking reach are commendable, qualitative advancements are still a work in progress.

Addressing Gaps and the Path Ahead

To actually close the gap between access to accounts and genuine financial inclusion, interventions are required on a multi-stakeholder front across financial institutions, regulatory authorities, civil society, and technology players. Policies have to look beyond minimum access and address financial literacy, credit scoring innovations for informal sector workers, mobile-delivered insurance services, and grievance redress mechanisms that instill user confidence. The potential of Artificial Intelligence (AI) and digital financial services lies in being able to tailor financial products to different groups of users, facilitating collateral-free credit scoring, and enhancing delivery of services using chatbots and predictive analytics (Sahay et al., 2020). Digital solutions, however, need to be adopted with caution so as not to leave behind the digitally

illiterate or less privileged classes and devices. Therefore, financial inclusion needs to be seen as a dynamic process—one that seeks both equity and innovation in order to make development inclusive, especially in the case of emerging economies such as India.

Bridging the Access-Usage Gap Through Multi-Stakeholder Approaches

Although opening bank accounts for the unbanked is a vital initial step toward financial inclusion, it falls short in bridging the complex challenges of low-income populations. The actual challenge is how to convert inactive accounts into dynamically used financial products that promote economic resilience and empowerment. This requires joint efforts on the part of multiple stakeholders—financial institutions, regulators, technology companies, and civil society groups. Financial institutions need to design inclusive product sets, and regulators need to develop enabling frameworks for digital innovation and consumer protection. Civil society groups play a key role in building grassroots financial literacy and trust in formal systems, particularly among women and marginalized communities (Chakrabarty, 2019). Without such a collaborative, ecosystem-wide approach, efforts at financial inclusion risk remaining superficial and unsustainable.

Beyond Access—The Role of Literacy, Innovation, and Redressal

For financial inclusion to be effective, policymakers need to move the focus beyond access to accounts to the provision of functionality, affordability, and utility of financial services. Key areas involve financial literacy programs that help people make informed choices, credit score innovations that allow informal economy workers to take loans without formal records or collateral, and the increase in mobile-based microinsurance schemes. In addition, user confidence can only be fostered by robust grievance redressal mechanisms that are timely, transparent, and culturally attuned. The Reserve Bank of India (2021) has stated that though digital payments adoption has increased, consumers still avoid using formal financial services owing to fears about failure of transactions, fraud, and weak recourse mechanisms. Therefore, to encourage participation and persistence, financial products and platforms need to be built around user-centricity.

Using AI and Digital Technologies for Inclusive Finance

New technologies, especially Artificial Intelligence (AI), have the tremendous potential to propel financial inclusion if used in an intelligent manner. AI can assist in creating hyper-personalized financial services, evaluate non-traditional data for creditworthiness, and enhance fraud prevention measures. As pointed out by Sahay et al. (2020), chatbots powered by AI are capable of providing 24/7 customer support across languages, predictive analytics can assist financial institutions in the identification of at-risk borrowers, and machine learning algorithms can build real-time risk profiles for underbanked borrowers. Digital financial products like mobile wallets and blockchain-based remittance systems are also making financial services quicker, less expensive, and more inclusive. But the success of these innovations relies on their inclusiveness—solutions need to be adapted to local languages, low-bandwidth settings, and easy-to-use interfaces that accommodate individuals with low digital literacy.

Telukdarie and Mungara (2023) highlight that the incorporation of AI technologies, such as machine learning algorithms and big data analytics, into the financial system has enabled banks and FinTech firms to provide services specifically designed for low-income and formerly unbanked individuals. Artificial intelligence-powered applications like chatbots enable customer interaction across languages and provide 24/7 support, ensuring access gaps in geographically unpenetrated regions. In addition, the use of biometric authentication, mobile banking, and electronic KYC systems lowers entry barriers and accelerates customer onboarding (Ozili, 2021; Kaur et al., 2020).

Ensuring Equity and Inclusion in the Digital Era

Even with the potential of digital technologies and AI to bridge financial divides, these solutions can also inadvertently widen exclusion if not equitably implemented. The digital divide continues to be a thorn in the flesh, particularly in rural and poor areas where smartphone, internet, and digital literacy are still out of reach. According to Chatterjee and Rana (2022), even with well-crafted digital platforms, they might not reach their desired beneficiaries because of infrastructural or socio-cultural limitations. This calls for inclusive digital transformation plans that take into account the most vulnerable. Financial inclusion can only be imagined as a dynamic and continuous process adapting to technological, social, and economic environments. In developing economies such as India, equity and innovation should go together so that financial services are not the domain of the digitally literate but a right available to everyone.

2. AI and Its Transformative Potential in Financial Services

Artificial Intelligence (AI) has come as a disrupting force to the financial industry through automating activities, improved customer service, and predictive capabilities (Bughin et al., 2018). Machine learning (ML), natural language processing (NLP), and robotic process automation (RPA) AI technologies help financial organizations better evaluate customers' credit worthiness, prevent fraud, and offer customized services (Brynjolfsson & McAfee, 2017). In the context of emerging economies, these capabilities have the potential to close the inclusion gap by reaching out to underserved communities cost-effectively (Arora & Rahman, 2021).

AI as a Disruptive Force in Financial Services

Artificial Intelligence (AI) has come to be a revolutionary force in industries worldwide, with the financial industry facing some of the most dramatic changes due to it. From back-office automation to risk-free real-time decision-making, AI is revolutionizing the way financial institutions operate. As per Bughin et al. (2018), the adoption of AI in financial institutions has resulted in greater efficiency, reduced operational expense, and enhanced precision in sophisticated processes. Algorithms can now handle enormous amounts of transactional data, allowing companies to extract insights at unprecedented velocity and accuracy. This ability not only simplifies banking services but also revolutionizes the strategic decision-making abilities of financial institutions. The disruptive potential of AI is its capacity to displace repetitive human work while, at the same time, providing scalable, data-driven solutions.

The Role of ML, NLP, and RPA in Financial Innovation

Of the numerous AI-driven technologies, machine learning (ML), natural language processing (NLP), and robotic process automation (RPA) are leading the charge in financial innovation. ML algorithms are heavily applied in credit scoring systems to allow financial institutions to assess creditworthiness based on alternative sources of data such as mobile usage, payment history, and social media usage. NLP allows customer interaction through AI-driven chatbots, voice banking, and sentiment analysis to understand customer needs and satisfaction levels better. RPA automates repetitive tasks like compliance checks, transaction processing, and customer onboarding. These tools help banks and non-banking financial companies (NBFCs) achieve greater operational agility and reduce human error (Brynjolfsson & McAfee, 2017). As a result, financial services are not only more efficient but also more responsive and user-friendly.

AI in Fraud Detection and Risk Management

One of the most critical applications of AI in finance is in the area of fraud detection and risk mitigation. Legacy systems tend to be based on static rule-based models, which have a tendency to have stale logic and a lagging response. This is unlike AI-powered systems, which can adapt dynamically to changing patterns

and hence are able to identify anomalies in real time. The systems leverage deep learning and behavioral analytics to identify suspicious behaviors like abnormal transaction patterns, attempted identity theft, or fabricated frauds. As per a McKinsey report, AI systems have demonstrated the potential to cut false positives by more than 30% while improving detection rates (Bughin et al., 2018). Through the automation of risk assessment and security audits, AI enables institutions to be proactive in protecting user assets and institutional reputation.

AI and Financial Inclusion in Emerging Economies

In developing nations, AI plays a significant role in pushing forward financial inclusion. Conventional banking infrastructures do not penetrate rural and marginalized areas because of the high cost of operations and no physical presence. AI-based financial technologies (fintech) bridge this gap by facilitating mobile-based banking, remote identity authentication, and micro-credit disbursement. Arora and Rahman (2021) state that AI uses in financial services, e.g., facial recognition for KYC (Know Your Customer) and biometric verification, aid in reaching the "last mile" communities without traditional documentation. In addition, AI can determine creditworthiness for those with no traditional credit history from non-traditional data sources, hence opening up access to capital for small-scale farmers, street vendors, and gig workers. In doing so, AI is not just augmenting financial services but making them more democratic.

Ethical and Infrastructural Considerations for Inclusive AI Deployment

While AI can bring great promise to financial inclusion, its rollout in developing economies should be done with care. Concerns like algorithmic bias, data privacy, and digital illiteracy are serious challenges. If AI systems are trained on biased data sets, they can reinforce exclusion instead of eradicating it. In addition, the digital divide in internet access, smartphone penetration, and technological literacy constrains the coverage of AI-powered services. Regulators and financial institutions need to put ethical AI design, inclusive data policies, and strong consumer protection frameworks first. Transparent audit trails, explainable AI, and human-in-the-loop systems can help ensure that AI tools are fair, accountable, and accessible (OECD, 2021). Thus, to fully realize AI's potential in fostering financial inclusion, a balanced strategy that marries innovation with equity is essential.

3. Role of AI in Enhancing Financial Inclusion

AI supports financial inclusion by lowering the cost of operations, expanding outreach, and reducing human bias in decision-making. Chatbots and digital assistants are available 24/7, facilitating the inclusion of rural and semi-urban populations that may have limited access to physical branches (Ghosh, 2020). AI-based credit scoring models also enable banks to provide microloans using alternative data, like mobile behavior and utility bill payments—aiding those who do not have traditional credit history (Varma & Kumar, 2022).

Cost Efficiency and Operational Scalability through AI

One of the strongest contributions of Artificial Intelligence (AI) to financial inclusion is its capacity to greatly minimize operational costs for financial institutions. Conventional banking entails physical infrastructure, extensive human capital, and time-consuming manual handling, which is usually costly and inefficient, especially in serving far-flung or rural clients. AI-based automation—such as robotic process automation (RPA), algorithmic processing, and smart data management—rationalizes processes such as customer boarding, loan application, and regulatory checks. Through this, financial service providers can expand their products without a linear rise in expense (Ghosh, 2020). This cost-effectiveness is essential for

banks and fintech companies that wish to cover low-income segments, where the margins are tight and the cost-to-income ratio must be carefully managed.

Reaching Underserved Populations

AI technologies also assist in transcending geographic and infrastructural hurdles in developing nations. In regions where access to bank branches is limited or non-existent, AI-powered digital channels have become instrumental in connecting rural and semi-urban populations to formal financial systems. Chatbots and virtual assistants, available 24/7, offer multilingual customer service and real-time responses, making banking accessible even to those with low literacy levels. Mobile banking apps integrated with voice or text-based AI assistants are helping bridge the digital gap for first-time users. As per Ghosh (2020), these tools are especially useful in rural India, where there is limited physical access to banking and traditional banking hours might not fit the users' daily schedule. AI thereby expands the spatial and temporal reach of financial services so that outreach is not limited by geography.

Alternative Data for Inclusive Credit Scoring

Traditional credit scoring systems predominantly depend on official financial information—like income statements, collateral, and history of borrowing—excluding a large majority of the population employed in the informal economy. AI-driven credit scoring models upend this system by including non-traditional data sources like mobile phone use, utility bill payments, e-commerce transactions, and even social media activity. These models leverage machine learning algorithms to provide real-time, dynamic creditworthiness ratings to enable lenders to reach first-time borrowers with no established credit track record (Varma & Kumar, 2022). This technology is most impactful in emerging markets where most small business owners, farmers, and gig workers are outside of the customary financial reach. By facilitating access to microloans and small-ticket credit, AI directly impacts economic empowerment and entrepreneurship among underprivileged groups.

Mitigating Human Bias and Ensuring Fairer Lending

Another essential benefit of AI for financial inclusion is its ability to mitigate human bias in decisions. Traditionally, human-managed loan approvals have been susceptible to discriminatory behaviors on grounds of gender, caste, socio-economic status, or personal opinions. Decision systems based on AI, if trained and audited well, provide more objective and fact-based results. Nevertheless, it is crucial to note that AI is not biased in nature—its fairness lies in the diversity and quality of training data it utilizes. Used responsibly, AI can guarantee fair access to financial services, cutting down on the occurrences of prejudice that generally deny opportunities to vulnerable groups (Binns et al., 2018). Institutions need to then institute fairness audits and open protocols to leverage the full power of AI in making a level financial playing field.

Ensuring Inclusive and Ethical AI Deployment

Although AI has tremendous potential for financial inclusion, its use must be directed by ethical imperatives and inclusive design principles. Digital illiteracy, unavailability of internet, and language diversity continue to remain barriers for millions in emerging markets. Financial technologies will thus have to be developed with localized user interfaces, low-bandwidth technology, and voice-orientated interactions where appropriate. Additionally, decision-transparency of AI systems, or explainable AI (XAI), is critical for establishing user trust and providing recourse processes in the event of errors. As underscored by Varma and Kumar (2022), ethical stewardship, consumer protection regimes, and community sensitization campaigns have to go along with technological rollout. The objective of AI-powered financial inclusion should be not just to include more but to do so equally, respectfully, and sustainably.

AI-Driven Credit Scoring and Risk Management for the Unbanked

One of the most significant applications of AI in financial inclusion is its application to alternative credit scoring. Conventional systems rely almost exclusively on formal financial records, thus locking out informal workers and low-income earners. AI algorithms, on the other hand, look at non-traditional data like payments for utility bills, mobile usage patterns, and social media activities to determine the creditworthiness of a client. This allows banks and other financial institutions to provide microloans and credit products to first-time borrowers who lack access to traditional financial records (Kshetri, 2021). Telukdarie and Mungara (2023) also identify successful case studies, including Migo in Nigeria and Kueski in Mexico, that utilize AI to increase lending opportunities. These technologies are particularly revolutionary in Sub-Saharan Africa, where rates of financial exclusion are still critically high, with nations such as Central Africa recording unbanked rates as high as 93% (Telukdarie & Mungara, 2023).

4. Challenges and Ethical Concerns in AI-Driven Financial Systems

Despite the potential of AI, there are a number of challenges that need to be addressed to achieve equitable and responsible deployment. To begin with, there is a threat of algorithmic bias: if AI is trained based on datasets that mirror prevalent societal biases, then the AI systems might inadvertently perpetuate discriminatory practices (Binns et al., 2018). Secondly, the increasing dependence on digital technologies threatens to leave out those who do not have digital literacy, e.g., the elderly or those in rural areas. Telukdarie and Mungara (2023) raise concerns regarding the unintended effects of excessive automation, that could lead to job loss or data privacy violations if not regulated. The use of AI should therefore be regulated by standards of transparency, accountability, and human intervention. Ethical design, policy alignment, and consumer protection policy are essential to avoid digital financial systems becoming tools of amplifying inequality that already exists (OECD, 2021; Ozili, 2020).-

4. Public Sector Banks (PSBs) in Maharashtra Using AI

Public Sector Banks (PSBs) in Maharashtra have progressively incorporated AI in their processes, though they are still constrained. As stated by a report prepared by NITI Aayog (2020), adoption of AI in Indian PSBs is encumbered due to legacy technology, data silos, and poor investment in digital transformation. Yet, there are banks such as State Bank of India and Bank of Maharashtra that have introduced AI-based apps for fraud identification, customer enrollment, and e-KYC operations (Chaudhary & Dutta, 2021). These software applications have shown particularly useful in enhancing efficiency while minimizing manual error in outreach campaigns in rural Maharashtra.

5. Challenges and Ethical Concerns

Though promising, AI adoption for financial inclusion also comes with some challenges. Data privacy, algorithmic bias, and AI illiteracy are among the key concerns (Reddy & Vasudevan, 2021). Moreover, AI tools need to be contextually developed to accommodate linguistic diversity, cultural sensitivities, and technological access in places such as Maharashtra. Inclusivity in AI design and deployment is important to avoid exclusionary results (Gurumurthy & Chami, 2019).

6. Policy Implications and Future Directions

To achieve the real benefit of financial inclusion, particularly in the PSBs of Maharashtra, encouraging policy environments and public-private partnerships are required. Regulatory institutions like the RBI and SEBI must harmonize AI ethics, safeguard data, and enable cross-sectoral cooperation (Mehta et al., 2022). Longitudinal studies in the future must examine the long-term effect of AI interventions on financial conduct and economic resilience of disadvantaged groups in India. For AI to achieve its full potential in driving financial inclusion, there is a need for a comprehensive and responsive policy framework. This involves creating national financial inclusion strategies that incorporate AI, increasing digital infrastructure, encouraging financial literacy, and building partnership among governments, regulators, and technology providers. Telukdarie and Mungara (2023) also suggest a systems dynamics model that takes into account the interactions among variables like financial literacy, institutional coverage, digital technology, and economic inequality. The model also indicates that focused investments in digital finance can generate quantifiable outcomes, such as higher tax collections, lower poverty, and faster GDP growth. Nations should also take into account their own socio-economic and regulatory environments when introducing AI-powered financial systems. Future studies should persist in investigating localized models and longitudinal data to further hone best practices for inclusive, AI-powered finance.

1. Research Gap in the Literature

In spite of increasing academic and policy focus on financial inclusion and AI, there are a number of gaps:

1. Sparse empirical data on the actual use and effectiveness of AI-based financial inclusion in Public Sector Banks (PSBs) in India, especially Maharashtra, is lacking.
2. - While studies so far recognize the promise of AI (Bughin et al., 2018; Arora & Rahman, 2021), there are few that look into locale-specific issues like digital illiteracy, legacy systems of banking, or infrastructural deficiencies in semi-rural and rural areas.
3. - The crossing of ethical issues, i.e., algorithmic bias and data privacy, with financial inclusion is yet to be fully explored.
4. - National-level approaches are stressed in most research, leaving a regional implementation gap for localized public banking systems addressing vulnerable groups.

2. Research Problems

Grounded on the identified gaps, the study addresses the following research problems:

1. How effectively are AI tools and platforms being integrated into PSBs in Maharashtra to improve financial inclusion?
2. What are the biggest hurdles (technological, institutional, or social) to the adoption of AI for inclusive finance in public sector banks?
3. In what ways does AI influence the accessibility, affordability, and usability of financial services by underbanked and unbanked populations?
4. What are the essential ethical, cultural, and infrastructural factors to ensure fair AI deployment in PSBs?

3. Research Objectives

The research has the following main goals:

1. To evaluate the existing reach of AI use in Public Sector Banks in Maharashtra with emphasis on inclusive banking opportunities.
2. To discuss how artificial intelligence-based interventions (e.g., chatbots, credit worthiness, biometric authentication) affect financial coverage, efficiency, and cost of access.
3. To determine restrictions and ethical dilemmas that may impede suitable AI integration in support of financial inclusion in rural and semi-urban areas.
4. To suggest policy and implementation strategies that can improve ethical, inclusive, and scalable AI practices in PSBs.

4. Hypotheses

From the objectives, the following hypotheses can be developed:

- H1: AI adoption in PSBs greatly enhances outreach and accessibility of financial services in rural and semi-urban Maharashtra.
- H2: AI-driven credit scoring has a positive impact on loan approval rates among erstwhile unbanked individuals.
- H3: There is a pronounced decrease in public sector bank operation costs due to AI-powered automation.
- H4: Digital illiteracy and readiness of infrastructure serve to hinder success in AI-pushed financial inclusion in remote locales.

References

1. Arora, R., & Rahman, Z. (2021). Artificial intelligence in financial services: A review and research agenda. *Journal of Financial Services Marketing* , 26 (3), 145–157. <https://doi.org/10.1057/s41264-021-00095-w>
2. Brynjolfsson, E., & McAfee, A. (2017). *Machine, platform, crowd: Harnessing our digital future* . W. W. Norton & Company.
3. Bughin, J., Seong, J., Manyika, J., Chui, M., & Joshi, R. (2018). *Notes from the AI frontier: Modeling the impact of AI on the world economy* . McKinsey Global Institute.
4. Chaudhary, S., & Dutta, P. (2021). Application of AI in Indian Public Sector Banks: Opportunities and Challenges. *Indian Journal of Economics and Development* , 17 (1), 18–24.
5. Ghosh, A. (2020). Artificial intelligence in banking: Opportunities for financial inclusion in India. *IUP Journal of Bank Management* , 19 (3), 7–22.
6. Gurumurthy, A., & Chami, N. (2019). AI and the gender digital divide: The need for inclusive policy. *IT for Change* . <https://itforchange.net>
7. Mehta, A., Singh, R., & Kiran, R. (2022). AI in Indian banking: Regulation and innovation balance. *South Asian Journal of Business and Management Cases* , 11 (2), 190–202. <https://doi.org/10.1177/22779779221100614>
8. - NITI Aayog. (2020). *Responsible AI for All: Strategy for India* . Government of India. <https://www.niti.gov.in>
9. - Reserve Bank of India. (2021). *Annual Report 2020-21* . <https://www.rbi.org.in>
10. - Reddy, R., & Vasudevan, A. (2021). Ethical implications of AI in financial inclusion: Indian perspective. *Journal of Financial Transformation* , 52 , 44–51.
11. - Varma, A., & Kumar, P. (2022). AI-Driven Financial Services for the Unbanked in India. *Asian Journal of Economics and Finance* , 4 (1), 112–121.
12. - World Bank. (2022). *Global Findex Database 2021* . <https://globalfindex.worldbank.org>
13. Demirgüç-Kunt, A., Klapper, L., Singer, D., Ansar, S., & Hess, J. (2022). *The Global Findex Database 2021: Financial Inclusion, Digital Payments, and Resilience in the Age of COVID-19* . World Bank. <https://doi.org/10.1596/978-1-4648-1842-1>
14. Government of India. (2023). *Pradhan Mantri Jan Dhan Yojana (PMJDY): Progress Report* . Ministry of Finance. <https://pmjdy.gov.in>
15. - Reserve Bank of India. (2021). *Report of the Committee on Deepening Digital Payments* . <https://rbi.org.in/Scripts/PublicationReportDetails.aspx?UrlPage=&ID=1165>
16. - Sahay, R., von Allmen, U. E., Lahreche, A., Khera, P., Ogawa, S., Bazarbash, M., & Beaton, K. (2020). *The Promise of Fintech: Financial Inclusion in the Post COVID-19 Era* 17. . IMF Departmental Paper No. 20/09. <https://www.imf.org/en/Publications/Departmental-Papers-Policy-Papers/Issues/2020/06/29/The-Promise-of-Fintech-Financial-Inclusion-in-the-Post-COVID-19-Era-48623>
18. - World Bank. (2022). *Financial Inclusion Overview* . <https://www.worldbank.org/en/topic/financialinclusion/overview>

19. Chakrabarty, K. C. (2019). Financial inclusion in India: Journey so far and way forward. *Journal of Financial Economic Policy*, 11(3), 385–400. <https://doi.org/10.1108/JFEP-01-2019-0004>
20. Chatterjee, R., & Rana, N. P. (2022). Digital financial inclusion: A systematic literature review and future research agenda. *International Journal of Bank Marketing*, 40(4), 648–673. <https://doi.org/10.1108/IJBM-03-2021-0097>
21. - Reserve Bank of India. (2021). *Annual Report 2020–21*. <https://rbi.org.in/Scripts/AnnualReportPublications.aspx>
22. - Sahay, R., von Allmen, U. E., Lahreche, A., Khera, P., Ogawa, S., Bazarbash, M., & Beaton, K. (2020). The Promise of Fintech: Financial Inclusion in the Post COVID-19 Era. IMF Departmental Paper No. 20/09. <https://www.imf.org/en/Publications/Departmental-Papers-Policy-Papers/Issues/2020/06/29/The-Promise-of-Fintech-Financial-Inclusion-in-the-Post-COVID-19-Era-48623>
23. Arora, S., & Rahman, Z. (2021). Artificial Intelligence in Financial Inclusion: Opportunities and Challenges in Emerging Economies. *Journal of Financial Services Marketing*, 26(2), 53–65. <https://doi.org/10.1057/s41264-021-00091-4>
24. Brynjolfsson, E., & McAfee, A. (2017). *Machine, Platform, Crowd: Harnessing Our Digital Future*. W. W. Norton & Company.
25. Bughin, J., Seong, J., Manyika, J., Chui, M., & Joshi, R. (2018). Notes from the AI Frontier: Modeling the Impact of AI on the World Economy. McKinsey Global Institute. <https://www.mckinsey.com/featured-insights/artificial-intelligence/notes-from-the-ai-frontier-modeling-the-impact-of-ai-on-the-world-economy>
26. OECD. (2021). Principles on Artificial Intelligence. Organisation for Economic Co-operation and Development. <https://www.oecd.org/going-digital/ai/principles>
27. Binns, R., Veale, M., Van Kleek, M., & Shadbolt, N. (2018). 'It's Reducing a Human Being to a Percentage': Perceptions of Justice in Algorithmic Decisions. *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*, 1–14. <https://doi.org/10.1145/3173574.3173951>
28. - Ghosh, S. (2020). Artificial Intelligence and Financial Inclusion in India: Opportunities and Challenges. *Journal of Emerging Technologies and Innovative Research*, 7(10), 59–66. <https://www.jetir.org/papers/JETIR2010072.pdf>
29. - Varma, A., & Kumar, S. (2022). AI-Based Credit Scoring in Emerging Economies: Enabling Financial Inclusion through Alternative Data. *International Journal of Financial Innovation in Banking*, 4(1), 45–62. <https://doi.org/10.1504/IJFIB.2022.100421>
30. Adedokun, M. W., & Ağa, M. (2021). Financial inclusion: A pathway to economic growth in Sub-Saharan African economies. *International Journal of Finance & Economics*, 11–21.
31. - Binns, R., Veale, M., Van Kleek, M., & Shadbolt, N. (2018). 'It's reducing a human being to a percentage': Perceptions of justice in algorithmic decisions. *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*, 1–14. <https://doi.org/10.1145/3173574.3173951>
32. Kaur, N., Sahdev, S. L., Sharma, M., & Siddiqui, L. (2020). Banking 4.0: The influence of artificial intelligence on the banking industry & how AI is changing modern banks. *International Journal of Management*, 11(9), 577–585.
33. Kshetri, N. (2021). The role of artificial intelligence in promoting financial inclusion in developing countries. *Journal of Global Information Technology Management*, 24(2), 81–95.

34. OECD. (2021). Principles on Artificial Intelligence . Organisation for Economic Co-operation and Development. <https://www.oecd.org/going-digital/ai/principles>
35. Ozili, P. K. (2020). Financial inclusion research around the world: A review. Forum for Social Economics , 49(4), 457–479.
36. Ozili, P. K. (2021). Big data and artificial intelligence for financial inclusion. In Artificial Intelligence Fintech and Financial Inclusion (pp. 1–15).
37. Telukdarie, A., & Mungara, A. (2023). The impact of digital financial technology on accelerating financial inclusion in developing economies. Procedia Computer Science , 217, 670–678. <https://doi.org/10.1016/j.procs.2022.12.263>

