

Artificial Intelligence Trends and Developments in Indian Public Sector Banks: A Customer-Centric Perspective.

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Abstract

As technological advancements in artificial intelligence continue to evolve, public sector banks in India are increasingly utilizing AI in green banking to enhance consumer experiences and optimize operational efficiency. This paper analyses trends and advancements in artificial intelligence in the public sector banking industry in India, contributing to environmental governance, improved operational efficiency, service enhancement, and the promotion of sustainable practices among banking institutions in India. This study employs a quantitative research design, utilizing a structured survey to collect data from 196 respondents across 12 public sector banks in India, strengthened by an extensive trend analysis from 2019 to 2025. The study employs a mixed-methods approach, specifically the relative importance index, incorporating secondary data analysis, case studies of leading public sector banks, and customer interviews to assess the influence of AI on green banking initiatives and their social implications, emphasizing environmental sustainability and user acceptance. The study indicates that respondents acknowledge that AI significantly improves green banking initiatives by increasing efficiency and reducing environmental impact. The study paper demonstrates the potential applications of AI in the banking sector. The effectiveness of AI in banking services is evaluated based on consumer preference. The findings indicate that customers believe artificial intelligence enhances banking services and significantly improves data security and fraud prevention through sophisticated monitoring and real-time analysis.

Keywords: Artificial Intelligence (AI), Public Sector Banks, environmental Impact, Customer Experience, Banking Operations.

1. Introduction

Artificial intelligence (AI) signifies systems controlled by computers that accomplish activities traditionally necessitating human intelligence and insight. Artificial Intelligence (AI) has become a revolutionary element in numerous industries, notably the banking sector. A McKinsey analysis predicts that AI may evolve towards a \$1 trillion industry inside financial services (Building the AI bank of the future, May 2021).

The financial services industry in India, particularly the public sector banks, has witnessed considerable transition as institutions adopt AI to satisfy growing customer requirements, regulatory standards, and competitiveness from private and fintech entities. Artificial intelligence is employed in banking to figure out fraud, address customer-related inquiries, analyse customer conduct, and provide personalized services. Artificial intelligence facilitates process automation, accelerates decision-making processes,

and streamlines customer request management while minimizing effort. It also aids with risk management by identifying and preventing money laundering and fraudulent transactions in real time.

The implementation of AI in Indian Public Sector Banks (PSBs) improved notably from approximately 18% in 2019 to nearly 58–60% in 2024, witnessing swift growth during the COVID-19 pandemic followed by an optimization period, while energy consumption dropped to about 22% due to digitization efforts and green banking initiatives. Public sector banks have progressively executed advanced artificial intelligence systems, such as chatbots, voice assistants, intelligent credit scoring mechanisms, AI-driven detection of fraudulent activity, automated document processing, biometric authentication, and AI-enabled KYC practices to improve data security and combat fraud.

The present research employs a quantitative and descriptive methodology, incorporating pertinent information sourced from secondary materials such

as journals, periodicals, research papers, and websites, in conjunction with primary data obtained from consumer interviews. This study, supported by limited primary research, prioritizes essential application scenarios of chatbot assistance and artificial intelligence in banking services by reviewing customer perceptions, assessing the magnitude of AI adoption, evaluating its impact on service standards, and identifying associated hurdles and future opportunities.

This article examines the substantial impact of AI on reliability and effectiveness in the banking sector, while emphasizing the obstacles and potential hazards associated with its extensive deployment. The insights acquired will enhance the overarching discussions on the amalgamation of technology with environmental and social regulation within the banking industry. The results of this study could enhance the digital transformation of AI banking sectors in India.

2. Literature Review

Yadav and Pathak (2013), find that Indian banks have acknowledged the importance of adopting preventative measures for ecological sustainability. Furthermore, the case study method indicates that public sector banks have undertaken more initiatives than private sector banks, apart from ICICI Bank. Among private sector entities, only ICICI Bank's approach is feasible.

Puschmann, T. (2017), finds that AI applications in banking range from customer service chatbots to complex algorithmic trading systems. The adoption of AI has improved efficiency, reduced operational costs, and enhanced customer experiences. For instance, AI-driven fraud detection systems have become more sophisticated, identifying fraudulent activities more accurately and swiftly than traditional methods.

Trivedi (2019), focuses on the front-end customer experience through chatbots based on three variables, namely system, information, and service. A hypothesis test takes place to evaluate whether the relationship among the three quality attributes and customer experience is influenced by perceived risk.

Shakil, M. H. (2020), finds banks contribute to societal well-being and environmental conservation by supporting environmentally sustainable projects; these initiatives also raise awareness among customers and encourage them to adopt more sustainable practices.

Agarwal et al. (2021), find that AI helps banks reduce their carbon footprint, streamline processes, and minimize energy consumption. AI technologies enable banks to reduce paper-based monetary transactions, facilitating digital alternatives that improve efficiency and minimize trash in public financial institutions.

Roy (2021), studied AI-enabled personalized banking services in India. The research found that SBI adopted customer segmentation tools to improve cross-selling and relationship management. They highlighted SBI's early initiatives, including basic chatbots and fraud detection systems. The research underlined the imperative for ethical data management and transparent algorithms.

Tripathi et al. (2022), find how artificial intelligence (AI) can support banks in spotting sustainable investment possibilities and monitoring ESG indicators, thereby promoting environmentally responsible financing practices. The execution of AI-driven green banking solutions encounters various hurdles, such as data privacy issues, enormous financial costs, and regulatory intricacies.

Pahari et al. (2023), analyse the utilization of AI in Indian banks, stressing the significance of staff member perception and acceptance of the technology for effective implementation. The findings demonstrate that employee perceptions of AI significantly influence implementation outcomes and organizational performance.

Narang et al. (2024), find that successful implementation of artificial intelligence in banking is contingent upon aligning technology capabilities with workforce readiness. This alignment is particularly crucial in public sector banks, where organizational atmosphere and change management protocols may differ from practices in private sector banks.

3. Research Gap

The existing academic literature on Artificial Intelligence (AI) in banking predominantly focuses on specialized institutions or the private banking sector, whereas banking institutions in the public sector receive very scant attention. Furthermore, a considerable number of these studies are based on worldwide banking trends, thereby disregarding the specific obstacles and opportunities present in the public sector banking industry in India. Although prior research predominantly focuses on enhancements in customer service facilitated by AI, it frequently overlooks essential aspects like operational efficiency and customer-centric ranking evaluations. Moreover, there is a significant deficiency of studies deploying recent, post-2020 data, leading to inadequate assessment of AI's immediate effects amid the rapid digital revolution after the pandemic.

4. Objective

- 4.1. To identify the major application areas of artificial intelligence (AI) in public sector banks in India.
- 4.2. To examine the trend of artificial intelligence (AI) adoption and its impact on green banking for promoting sustainable development in Indian public sector banks.
- 4.3. To analyse the impact of artificial intelligence (AI) adoption in green banking on banking operations and efficiency in public sector banks in India.

5. Research Methodology

- 5.1. Research Design: This research paper employs a both descriptive and analytical techniques to study the impact of artificial intelligence on banking operations and outcome metrics associated with public sector banks in India. This involves evaluating the deployment of AI in banking operations via contemporary articles and research investigations.
- 5.2. Theoretical & Conceptual Framework: The conceptual framework assumes that AI adoption influences five major outcomes:

a) Faster and convenient

b) Service accuracy

c) Security and fraud detection

d) Environmental performance

e) Customer Satisfaction

5.3. Source of Data Collection: Primary data is collected through structured interviews and Likert scale-based questionnaires from 196 customers divided equally among the 12 public sector banks in India, and secondary sources are annual reports, BI publications, newspapers, bank websites, and industry reports (e.g., NASSCOM, PwC, McKinsey, IBM reports).

5.4. Sample Size: Using Cochran's formula

$$n = (Z^2 * p * q) / e^2$$

Where Z = 1.96 (95% confidence)

$$p = 0.5, q = 0.5, e = 7\% \text{ margin of error}$$

$$n = (1.96^2 * 0.5 * 0.5) / 0.07^2$$

$$n = (3.8416 * 0.25) / 0.0049$$

$$n = 0.9604 / 0.0049$$

$$n \approx 196$$

5.5. Area of Study: The study focuses on mainly northeast India, covering urban, semi-urban, and rural branches of PSB. The time frame for the data considered is 2019-2024, ensuring a contemporary understanding of AI trends.

5.6. Sampling Technique: A stratified random sampling technique was used.

5.7. Ethical Considerations: The data utilized is derived from reputable public sources. Confidentiality is preserved for all primary data gathered. There is no alteration or distortion of data represented.

5.8. Statistical Tools: Mean Score Analysis, Percentage Method, Trend analysis of Key Financial Metrics, Relative Importance Index.

6. Application of AI in the Indian Banking Sector

Artificial Intelligence (AI) is significantly revolutionizing the Indian banking sector by improving efficiency, security, and customer satisfaction. It automates routine duties such as

entering data and fraud detection, thereby drastically decreasing operating expenses. Simultaneously, AI-driven chatbots offer round-the-clock consumer assistance. Machine learning algorithms evaluate customer data to provide personalized services and identify suspicious transactions, hence improving security.

6.1. Customer assistance & chatbots: The incorporation of AI has transformed customer service and chatbots to communicate, enabling businesses to deliver tailored and efficient assistance to their customers. AI-driven chatbots can assess consumer inquiries, comprehend the intended solutions, and lessen the necessity for human involvement. AI-driven customer service infrastructures can assimilate knowledge from client interactions, refining their responses and provide insights to businesses for further develop their products and services. By utilizing AI, banking institutions may provide outstanding customer experiences, foster loyalty, and stimulate growth.

6.2. Fraud Detection & Risk Management: Artificial intelligence monitors transaction patterns instantaneously to detect anomalous behaviours and combat fraud. The application of machine learning algorithms identifies anomalies, such as atypical spending patterns, numerous unsuccessful login attempts, or transactions originating from unanticipated areas. Artificial intelligence strengthens cybersecurity by detecting phishing attempts, malware threats, and unauthorized access to banking systems. Automated risk assessment assists banks in assessing credit worthiness and identifying potential money laundering occurrences.

6.3. Loan & Credit Assessment: An AI-driven loan and credit system can analyse the behaviours and patterns of customers with minimal credit history to evaluate their financial standing. Additionally, this system can alert banks of specific behaviours that may heighten the risk of default, helping to facilitate proactive risk management. This AI mitigates subjective bias in loan approvals and accelerates the decision-making process. FinTech organizations utilize artificial intelligence to authorize micro-loans in a fraction of minutes.

6.4. Personalized Banking Experience: The incorporation of AI in banking services boosts customer experience and elevates user convenience. AI technology lessens the duration required to document KYC information and eradicates inaccuracies. AI facilitates the prompt distribution of emerging products and financial offerings.

6.5. Automated Processes & Efficiency: AI-driven robotic process automation, also known as RPA, streamlines routine tasks, such as data entry, document validation, and compliance assessments. It diminishes errors and operational expenses while enhancing efficiency. This also enables customers to focus primarily on more intricate tasks that necessitate human skill and engagement.

6.6. AI-Powered Trading & Investment: Artificial intelligence trading algorithms evaluate market behaviour, news, and financial information to inform investing decisions. Sophisticated mobile banking applications utilizing machine learning to analyse market attitudes and offer individualized investment recommendations. To invest in equities and take precautions when there is a potential hazard. Artificial intelligence systems for banking advises the optimal moment. Hedge funds and financial institutions utilize AI for algorithmic trading owing to its substantial data processing capability, facilitating swifter and more precise trades.

6.7. Regulatory Compliance & AML (Anti-Money Laundering): Artificial intelligence facilitates the computerization of compliance procedures and guarantees compliance with banking standards. Facilitates the identification of money laundering operations through the analysis of payment characteristics.

6.8. Smart Wallets: Mobile wallets integrated with artificial intelligence for expenditures on transportation, activities, movies, and utility expenses.

6.9. Debt Collection and Recovery: Predictive models assess the probabilities of recovery and propose customized recovery measures. This enhances collection efficiency and diminishes non-performing assets (NPAs). AI-driven debt collection

systems enhance customer engagement by providing options for flexible repayment.

Table 1: Implementation of chatbots in public sector banks in India

SL no	Name of the Bank	Name of Chatbot	Year of Starting
1	State Bank of India	SIA	2017
2	Union Bank of India	UVA	2017
3	Indian Bank	ADYA	2021
4	Punjab National Bank	PIHU	2017
5	Central Bank of India	Cent Bot	2019
6	UCO Bank	Uma	2020
7	Bank of Maharashtra	BoMy	2022
8	Canara Bank	Candi	2017
9	Bank of India	BOI SEVA	2020
10	Indian Overseas Bank	Iob Buddy	2021
11	Bank of Baroda	ADI	2023
12	Punjab and Sind Bank	PSB UnIC	2019

Source: Compiled by the author using annual banking reports of listed public sector banks

7. Present status of artificial intelligence (AI) in the Indian banking sector

The Indian public banking industry has undergone a modest yet consistent upward trend in AI implementation. The implementation of artificial intelligence (AI) and machine learning (ML) (machine learning) in diverse banking operations has facilitated the provision of notably more individualized and accurate customer support. The State Bank of India (SBI), Bank of Baroda, City Union Bank, and Allahabad Bank have been leading

in the adoption of artificial intelligence. SBI is currently utilizing an AI-driven, technologically sophisticated solution provided by Chapdex. This AI-driven technology analyses cameras located in bank branches and tracks the facial expressions of consumers. SBI has introduced the chatbot SIA, created by PAYJO, a business based in Silicon Valley and Bengaluru. The State Bank of India organized a national hackathon titled "Code for Bank" aimed at encouraging developers, businesses, and students to present unconventional ideas and strategies for the financial services sector.

8. Trends in AI adoption and its impacts in public-sector banks in India

Table 2. Trends in AI adoption and its impacts in public-sector banks in India

Year	AI adoption	Energy Consumption Index	Paperless Transaction
2019	18%	100	96.7%
2020	24%	96	97.2%
2021	31%	92	97.8%
2022	41%	87	98.5%
2023	52%	82	99.3%
2024	58%	78	99.7%

Source: Compiled by the author using data from RBI Reports, NASSCOM AI Trends (2024), PwC India Banking Outlook, etc.

The introduction of artificial intelligence (AI) in Indian public sector banks (PSBs) has shown substantial development from 2019 to 2024. In 2019, adoption of artificial intelligence was approximately 18%, rising to 24% in 2020, indicating an upward trend of roughly 33% attributed to accelerated digital transformation during the COVID-19 pandemic. The implementation climbed to 31% in 2021 and 41% in

2022, signifying ongoing technological advancement in banking operations. As of 2023, AI use attained over 52%, indicating broader utilization in fraud detection, customer service, and loan processing. In 2024, AI adoption is anticipated to reach approximately 58–60%. AI adoption in public sector banks has nearly tripled from 2019 to 2024, with an average yearly growth rate of approximately 25–28%. This trend indicates that Indian public



sector banks are swiftly transitioning to digital and AI-driven banking processes. The utilization of energy in Indian Public Sector Banks (PSBs) has seen a gradual decline from 2019 to 2024, attributable to the implementation of artificial intelligence (AI) and green banking efforts. Using 2019 as the base index (100), energy usage declined to 96 in 2020, reflecting a 4% reduction mostly attributed to digital banking throughout the COVID era. In 2021, the score decreased to 92, indicating a 4.2% fall attributed to the rise of online banking and fewer branch visits. The energy consumption index fell to 87 in 2022, reflecting a 5.4% decrease due to the rise of AI-driven automation and paperless banking. In 2023, the score declined to 82, reflecting a 5.7% reduction attributed to cloud computing and intelligent data administration technologies. By 2024, the score attained 78, indicating an additional 4.9% decrease propelled by green financial

infrastructure and energy-efficient technologies. Energy usage in PSBs decreased by almost 22% from 2019 to 2024, underscoring a major impact of AI implementation and sustainable banking practices on energy conservation. From 2019 and 2024, paperless transactions conducted in Indian public sector banks experienced significant expansion. In 2019, digital transactions represented 96.7% of all transactions, rising to 97.2% in 2020 and 97.8% in 2021. The portion rose to 98.5% in 2022 and 99.3% in 2023, attributed to the swift acceptance of digital banking. By 2024, paperless transactions were around 99.7% of total transactions, with only about 0.3% retaining paper based. Paper-based transactions decreased from 3.3% in 2019 to 0.3% in 2024. This graph illustrates the significant influence of artificial intelligence utilization, digital banking, and green banking procedures inside Indian public sector banks.

9. Data Analysis & Interpretation

Table 3: Demographic Profile of Respondents (n=196)

Demographic Factors		Frequency	Percentage
Gender	Male	116	59.18%
	Female	80	40.81%
Age	Below 25	94	47.95%
	25 to 50	76	38.77%
	Above 50	16	00.81%
Education	Below 12 th	23	11.73%
	Above 12 th	173	88.26

Source: Compiled by the author based on primary customer data.

9.1. Interpretation of Demographic Characteristics: The sample comprised 59.18% males and 40.81% females, demonstrating balanced representation. Most respondents (47%) were under 25 years of age, and 88.26% accomplished education above the

12th grade, indicating a higher level of academic and technological competence and greater exposure to AI-based applications. This demographic distribution promotes the study's validity in comprehending actual AI usage patterns.

Table 4: Multiple Response Analysis of AI Application Areas

Areas of AI Application used	Yes		No		Total	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Chatbots	175	89.28	21	10.72	196	100%
Voice Assistant	151	77.04	45	22.96	196	100%
Biometric Authentication	167	85.20	29	14.80	196	100%
AI based KYC	189	96.42	7	3.58	196	100%
Fraud detection AI models	181	92.34	15	7.66	196	100%

Source: Compiled by the author based on primary customer data.



9.2. Interpretation of Multiple Response Analysis: The table indicates that the frequency analysis assessing the helpful usage of artificial intelligence in banking and financial services concluded that 89.28% of respondents perceive chatbot applications to be exceptionally useful; however, 77.04% regard voice assistants as helpful in banking and financial

services .20% of respondents indicate that authentication and biometrics are highly beneficial; 92.34% assert that the identification and avoidance of fraud are employed to safeguard data, and 96.42% hold the opinion that KYC/AML applications are really useful for providing documents and further information.

Table 5. Respondent-based analysis of artificial intelligence applications in Indian public sector banks.

Utility of AI in Banking Services	Strongly agree (5)	Agree (4)	Neutral (3)	Disagree (2)	Strongly disagree (1)
AI improves service Faster and convenient	80	71	27	13	5
AI improves service accuracy	85	63	22	18	8
AI improves security and fraud detection.	96	73	19	6	2
AI improves the bank's environmental performance	71	53	49	18	5
AI improves customer overall satisfaction	108	67	17	3	1

Source: Compiled by the author based on primary customer data.

9.3. Relative Importance Index-Based Assessment of AI Usefulness in Banking Services.

For instance, if the weight assigned to 'Strongly agree' is 5, the appropriate weighted score for 'AI improves faster and more conveniently' will be calculated as $80 * 5 = 400$. The calculating technique is reiterated to produce the table below:

9.3.1. Weighted score: This method is utilized to measure the response that is recorded in the table. 5.

Table 6: Weighted scoring of artificial intelligence applications in Indian public sector banks.

Utility of AI in Banking Services	Strongly agree (5)	Agree (4)	Neutral (3)	Disagree (2)	Strongly Disagree (1)
AI improve Faster and convenient	400	284	81	26	5
AI improve service accuracy	425	252	66	36	8
AI improve Security and fraud detection	480	288	57	12	2
AI improve bank's Environmental performance	355	212	147	36	5
AI improve customer overall Satisfaction	540	268	51	6	1

Source: Compiled by the author based on primary customer data.

9.3.2. Calculation of Relative Important Index (RII) and ranking:

Total Number (N) : Number of respondents = 196

A: Total number of use cases = 5

Total: Sum of all weighted scores for each row calculated in Table

Relative Importance Index (RII): $Total / (A * N)$

Table 7: Relative Importance Index (RII)-based ranking of artificial intelligence applications in Indian public sector banks.

Utility of AI in Banking Services	Total	Total no of respondents (N)	A*N	RII	Rank
AI improve Faster and convenient	796	196	980	0.8122	3
AI improve service accuracy	787	196	980	0.8030	4
AI improve Security and fraud detection	839	196	980	0.8561	2



AI improve bank's Environmental performance	755	196	980	0.7704	5
AI improve customer overall Satisfaction	866	196	980	0.8836	1

Source: Compiled by the author based on Calculation of relative important index (RII) and ranking

10. Data Interpretation and Findings:

The survey acquired responses from 196 respondents to evaluate their impressions of the acceptance of artificial intelligence in banking services, emphasizing convenience, security, service accuracy, and overall customer satisfaction. The study was carried out using the distribution of responses on a five-point Likert scale, encompassing Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree. The efficacy of AI applications in financial services has been evaluated and ranked utilizing the Relative Importance Index (RII) technique, with rankings designated from 1 to 5 correspondingly.

10.1. AI Enhancing Convenience and Speed: Among of 151 respondents, a majority of 77% of the sample (80 Strongly Agree and 71 Agree) affirmed that AI-based banking services contributed to improving the speed and convenience of banking. Conversely, merely 9% of respondents (13 Disagree and 5 Strongly Disagree) conveyed disagreement, signifying a predominantly favourable view of AI's contribution toward enhancing transactional speed and convenience in banking services. Artificial intelligence facilitates accelerated and more convenient banking services via automated responses, improved credit evaluation, and streamlined loan processing, while also enabling customized financial services. It diminishes operational faults, processing duration, and service expenditures, thereby improving satisfaction among customers via round-the-clock service availability. The variable achieved a total score of 796, with the Relative Importance Index (RII) computed at 0.8122, ranking third in consumer preference and perceived utility of applications that use AI in banking services.

10.2. AI improves service accuracy: A group of 148 respondents, constituting roughly 75% of the sample, indicated agreement that AI-driven financial services had enhanced service accuracy. A significant portion of replies were categorized as

Strongly Agree and Agree. Conversely, almost 13% of those surveyed (18 Disagree and 8 Strongly Disagree) indicated disagreement, suggesting a degree of uncertainty or potential for enhancement in perceived service accuracy. Artificial Intelligence significantly enhances the accuracy and reliability of banking operations by minimizing human errors and augmenting data precision. The variable achieved a total score of 787, with the Relative Importance Index (RII) computed at 0.8030, ranking it 4th regarding customer preference and perceived use of AI applications in banking services.

10.3. AI improves security and fraud detection: Among of 169 respondents, approximately 86% of the participants (96 Strongly Agree and 73 Agree) asserted that AI-powered banking solutions had enhanced security and fraud detection. Conversely, under 4% of respondents (6 Disagree and 2 Strongly Disagree) indicated fear or distrust, which may serve as a possible impediment to broader acceptance of AI-based banking services. Artificial intelligence is essential in fraud detection, as it monitors transaction sequences, identifies anomalies, and facilitates real-time threat identification, resulting in it more effective than conventional fraud detection techniques. The results demonstrate a generally favourable impression of AI's contribution to improving security and fraud detection in financial services. The variable achieved a total score of 839, with the Relative Importance Index (RII) computed at 0.8561, ranking second in consumer preference and perceived utility of applications of artificial intelligence in banking services.

10.4. AI improves banks' environmental performance: A group of 124 respondents, including roughly 63% of the sample (71 Strongly Agree and 53 Agree), asserted that AI-based financial services significantly improved the bank's sustainability. Conversely, 11% of respondents (18 Disagree and 5 Strongly Disagree) articulated opposing opinions; however, the aggregate responses continue to reflect a predominantly favourable view of AI's contribution to enhancing environmental

performance in banking operations. Artificial intelligence enhances operational efficiency by decreasing energy usage, optimizing processes, and facilitating paperless banking practices. It additionally facilitates the finding of sustainable investment prospects and promotes green finance efforts. The variable achieved a total score of 755, with the Relative Importance Index (RII) estimated to be 0.7704, ranking 5th regarding consumer preferences and perceived use of applications of artificial intelligence in financial services.

10.5. AI improves customer overall satisfaction: A total of 175 participants, which is including almost 89% of the survey respondents (108 Strongly Agree and 67 Agree), indicated that AI-based financial offerings have enhanced overall satisfaction among consumers. In contrast, only 2% of respondents (3 Disagree and 1 Strongly Disagree) expressed dissatisfaction, indicating a strong overall approval of AI applications in banking services. The results reflect a highly positive perception of AI's contribution to customer satisfaction in banking services. The variable recorded a total score of 866, and the Relative Importance Index (RII) was calculated at 0.8836, which ranked 1st in terms of customer preference and perceived usefulness of AI applications in banking services. AI-driven digital channels, including chatbots and intelligent platforms, enhance customer engagement by delivering fast, personalized, and efficient services and improve service quality and customer satisfaction.

11. Challenges of AI implementation in Indian banks:

A broad range of individuals are anxious about the transition from physical to digital. The assumption of substantial expenses associated with the implementation of AI technologies hinders the project. An inexperienced individual requires training to fully comprehend the latest technology. The unavailability or substandard quality of data may lead to misleading predictions and impair the performance of AI systems. AI-driven banking must adhere to stringent regulatory standards established by financial authorities. Inaccurate data sources associated with e-KYC compliance AI systems may result in security vulnerabilities. The primary

hurdles encompass the enormous expense of AI technology, an inadequate number of qualified workers, and apprehensions around data privacy and security.

12. Suggestions and recommendations

To optimize the beneficial effects of artificial intelligence in banking, public sector banks must emphasize ongoing employee training and the advancement of digital competencies, while likewise raising customer awareness of AI-driven technologies. Incorporating multilingual capability, encompassing Hindi and regional languages, into AI interfaces can enhance accessibility and user experience. The combination banking paradigm integrating AI with human involvement should be prioritized to preserve individualized services. Moreover, strengthening AI security protocols and augmenting AI-driven customization capabilities would improve customer trust, engagement, and overall satisfaction among consumers.

13. Conclusion

AI is essential for enhancing banking performance in domains such as cybersecurity, risk management, fraud prevention, customer service and chatbots, financial aid, loan processing, customer management, and regulatory compliance. Almost every public sector bank has officially begun the implementation of chatbots for customer involvement on their online banking platforms. The level of customer service is identified as the predominant application for chatbot support. The usage of AI in Indian Public Sector Banks (PSBs) increased markedly from approximately 18% in 2019 to nearly 58–60% in 2024, experiencing swift expansion during the COVID-19 pandemic, followed by a phase of optimization, while energy consumption decreased by about 22% due to digitization and environmentally friendly banking initiatives. Consumers in the Banking and Financial Services (BFS) industry exhibit significant awareness of artificial intelligence (AI) applications. Frequency analysis reveals a significant perceived utility of artificial intelligence in essential sectors, with KYC/AML applications rated top, succeeded by identifying fraud and preventative measures,

chatbots, authentication and biometrics, and voice-controlled assistants.

A substantial majority of participants concur that AI has improved convenience, efficiency, service level of accuracy, and security in their banking interactions. AI-enabled chatbots and fraud detection systems have great significance for enhancing customer service and ensuring safety in online transactions. A minority of respondents highlighted apprehensions regarding the security and precision of AI services, indicating potential areas for enhancement. The report demonstrates the transformative influence of artificial intelligence on public sector banks in India. The implementation of AI has led to significant improvements in operational efficiency and customer service. Nevertheless, it also presents issues that require consideration. Public banks must manage the opportunities and risks connected to AI adoption, assuring ethical and responsible utilization. The enactment of AI in green banking practices is regarded as a catalyst for sustainable development that can advantage banks, enterprises, and the environment overall.

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