International Journal of Economic Practices and Theories (IJEPT)
ISSN: 2247-7225
Volume 2026, Issue 1

Comparative Study of AI Adoption in Public vs. Private Indian Banks

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ABSTRACT

Currently artificial intelligence (ai) is gaining momentum as a transformative force within the Indian banking industry particularly in urban regions such as Delhi NCR. This study evaluates ai adoption in select public sector banks vis-à-vis private sector banks using primary survey data (n=289). Findings indicate that ai adoption rates and corresponding levels of service efficiency and customer satisfaction are higher amongst private sector banks. Statistical techniques used such as percentage analysis, mean scores, chi-square test & t-test confirmed statistically significant difference between two types of banks. Correlation and regression analyses indicated strong positive relationship between ai driven efficiency & usage with respect to customer satisfaction. The findings also highlighted the supportive roles played by awareness and ease-of-use in improving overall banking experience. Thus, the findings suggest that private sector banks possess competitive advantage primarily due to superior technological infrastructure & faster innovation adoptions. Conversely public sector banks are gradually advancing but need strategic improvements to keep pace with digital transformation. The research contributes to knowledge pertaining to growing significance of ai in influencing customer centric banking services. The study offers useful understandings for bank management to enhance ai integration for sustainable growth & improved service delivery.

Keywords: AI, Public Banks, Private Banks, India, Adaptation

Introduction

Beginning with an overview of artificial intelligence's (AI) emergence as a transformational force in banking across the globe, ai is transforming how banks deliver, manage, and experience their customers through their various delivery channels. As a result of the expansion of digital platforms; the increase in internet access among consumers; and the governmental support of digital India, etc., there is a clear indication that advanced technologies will be integrated more rapidly than previously anticipated within the banking sector of India (Gupta, v. P., et.al., 2016). With regard to banking applications including but not limited to chatbots, predictive analytics, fraud detection, and personalized financial services, these applications are being incorporated at an increasing rate into the operations of banking institutions. As it relates to the examination of the Indian banking system, which includes both public sector banks and private sector banks, provides a distinct backdrop for evaluating technological adoption.

Generally speaking, private sector banks are known for being innovators with regards to adopting customer-centric strategies, operational efficiencies & profit-oriented goals. Aspects of these characteristics enable private sector banks as first movers with regards to implementing ai technology (P., & Gupta, et.al., 2017). On the flip side public sector banks serve a broader clientele base while developing higher level of trust with its customers; however public sector banks suffer from various constraints such as legacy systems, regulatory barriers & financial constraints limiting their ability to implement ai based solutions. Considering the role of ai in enhancing quality of services; reducing operating expenses; and facilitating informed decision making related to client service; it becomes imperative to evaluate how both public sector banks & private sector banks employ ai technology. Furthermore, since clients residing in urban areas similar to Delhi-NCR tend to be more digitally savvy & require rapid efficient service from their respective banks, the application of ai presents a significant differentiator between competitor banking institutions. Empirical evidence collected throughout this research study, the purpose of this study is to conduct comparative assessment relating to the utilization of ai technology in select public sector banks vs. Select private sector banks.

The scope of this study encompasses an evaluation of the level of awareness among bank customers regarding ai technology; the manner in which customers utilize ai technology in relation to banking activities; measures of efficiency associated with banking operations that utilize ai technology; and customer satisfaction levels resulting from banking activities facilitated through ai technology. It is anticipated that the results obtained during the course of this research will assist bankers & researchers in developing an enhanced understanding of the emerging trends within the context of AI-driven banking in India.

Review of Literature

Sharma & Gupta (2020) studied the role of AI in supporting customer relationship management (CRM). The authors reported that AI-based personalized engagement significantly influenced customers' level of engagement and satisfaction. Furthermore, their research demonstrated that private banks exhibited higher levels of adoption of AI-based CRM products compared to public banks. Mehta & Singh (2021) observed that both digital banking and AI-related adoptions accelerated rapidly during the pandemic given that consumers were increasingly relying on Internet-enabled services. (Kaur., 2023) conducted their study & pointed out that the public sector banks generally lagged behind on each of these kinds of parameters leading to lower adoption rates.

Accordingly, the RBI Report (2024) stated that the private sector banks were the first adopters of AI technology including chatbots, machine learning and advanced analytics. Additionally, the survey pointed out that larger banks with relatively higher capital adequacy ratios were more inclined to invest in new AI-based innovative solutions. Further A study by Bhambhani et al. (2025) illustrated that the application of AI made services much better, faster and more enjoyable for customers. Additionally, the researchers found that automation decreased the involvement of humans in the process and increased the accuracy of banking operations.

Kumar & Manchikatla (2025) conducted a comparative financial evaluation of public and private banks and confirmed that AI-based adoptions significantly contributed towards improvement in profitability and operational efficiency. However, the authors further noted that private banks generated faster returns on investments in technology compared to public banks. Moreover Gupta & Shrivastava (2025) evaluated the strategic implications of AI within the BFSI sector and established that AI acts as a major driver for gaining competitive advantage. Despite this fact, differences in adoption rates continue to prevail mainly due to disparities in available financial resources and technological preparedness. Also, a target-specific comparative analysis carried out by Singh et al. (2026) revealed that private sector banks surpassed public sector banks in

terms of AI-adoption index, innovation capabilities and customer satisfaction. According to the authors, the reason for this disparity lies in private organization's ability to innovate and invest in newer technologies.

Further Apoorva & Kansal (2026) also investigated consumer perspectives regarding AI and determined that trustworthiness, ease-of-use and perceived usefulness are key determinants for accepting AI. Additionally, private banks scored higher on each of these aspects contributing to increased customer engagement. Finally SAS & IDC (2026) concluded that although the usage of AI is increasing however only a few banks have completely implemented "Trustworthy" AI. Therefore, various challenges persist related to governance, data security and ethics.

Research Methodology

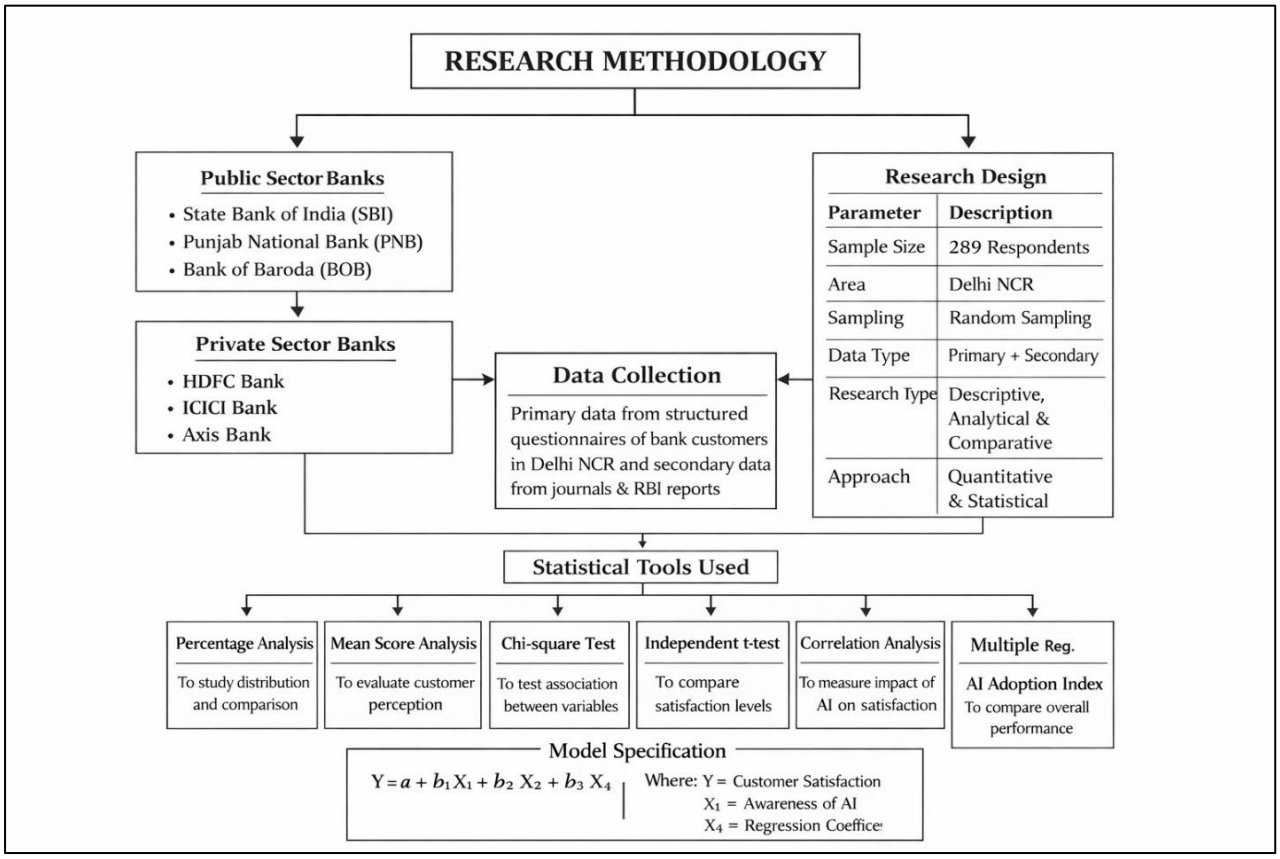

Figure 1: Research Methodology Model

Objectives of the study

- To compare the adoption of AI in selected public & private banks
- To examine customer usage & awareness
- To evaluate the satisfaction levels in selected public & private banks
- To measure influence on efficiency in selected banks

Hypothesis framework

- **$H0_1$:** There is no significant differences exist by adopting AI in selected banks

- **$H1_1$:** There is significant differences exists by adopting AI in selected banks
- **$H0_2$:** There is no impact on satisfaction by adopting AI in selected banks
- **$H1_2$:** There is high impact on satisfaction by adopting AI in selected banks
- **$H0_3$:** Variables of AI don't significantly impact satisfaction collectively
- **$H1_3$:** Variables of AI significantly impact satisfaction collectively

Data Analysis & Interpretation

Table 1: Respondents Distribution Bank-wise

Selected Banks	SBI	PNB	BOB	HDFC	ICICI	Axis	Total
Respondents Responses	61	47	45	53	44	39	289

A total of 289 survey participants were recruited from six different banks located within the Delhi National Capital Region (NCR). Of those surveyed, public-sector banks represented 53 percent of the total number of participants surveyed with 136 representing private banks. SBI was the most heavily represented bank, and thus represents the majority of bank customers in this area. In terms of private banks, HDFC had the second greatest number of survey participants, which may suggest that HDFC has an advantage over other private banks in terms of their ability to penetrate the urban market. The even distribution allows for equitable comparisons among both sectors without favoring one specific bank. A similar market-share reality exists since public banks still retain many customers. The evenly distributed sampling will allow for increased confidence in comparing statistics and therefore provide increased credibility for research conclusions.

Table 2: AI Services for Awareness

	Responses		
Type of Bank	Yes	No	Total
Public	91	63	154
Private	109	26	135
Total	201	88	289

Data collected from the surveys clearly showed there was a significant difference between public and private bank customer awareness regarding AI-based services. The surveys revealed that approximately 80.8% of private bank customers reported being familiar with AI-based services offered through their bank versus about 59.7% of public bank customers. This difference in familiarity may reflect the fact that private banks engage in more robust digital communications than public banks. Additionally, it appears that public banks have failed to promote AI-based services effectively. Therefore, public banks appear to have limited technology outreach and/or do not fully understand how to utilize technology.

Table 3: AI Services for Usage

Banks		
Level of Usage	Public	Private
High Usage	39	88
Moderate Usage	71	34
Low Usage	44	13
Total	154	135

Clearly expose from the data presented in above table is that there is differences in usage level in between private bank customers as well as customers of public banks. The data also highlighted that approximately 64.9% customers of private banks representing high-usage rates versus just 25.6% for public bank customers. Moderate usage accounts for almost 50% of responses provided by public bank customers, indicating partial adoption. The reasons behind the disparity between usage levels are associated with aspects of private banks' apps including user-friendly interfaces, fast services and personalization features. Furthermore, a higher percentage of respondents selected the low usage category for public banks, and therefore indicated some degree of technological hesitancy or distrust. The evidence demonstrates that private banks have been successful at integrating AI into the normal course of doing business for their customers.

Table 4: Mean Value for Service Quality

Banks		
Parameters	Public	Private
Ease of Use	3.3	4.4
Speediness	3.2	4.5
Accurateness	3.3	4.7
Satisfaction Level	3.5	4.6

In table 4 all 03 parameters were examined, each parameter for private banks having score >4.4 on average & it demonstrated that there is high levels of customer satisfaction. on the other hand, public banks averaged a score of around 3.3 on all 03 parameters, which signifying that there is average service quality. Differences in speediness & satisfaction level were greatest among all the parameters, strengthens the role that AI plays in creating timely & accessible services. Respondents as per data perceived private banks because of superiority feature based upon their efficiency level & dependability has been created through seamless integration of AI into their day-to-day banking experiences. Public banks struggle with slower computer systems, reduced personalization options and several other issues that hinder effective implementation of AI solutions. The results demonstrate conclusively that when properly implemented, AI greatly increases customer satisfaction. As such, public banks must prioritize investing in AI solutions to close this gap.

Table 5: Chi_Square Test

Categories	Banks	O	E	$(O-E)^2/E$
Yes	Public	92	106.7	2.27
No	Public	62	47.4	5.24
Yes	Private	110	94.5	2.56
Private No		25	40.6	6.02
Total χ^2				16.09

Table 5: In table 5 determining significant differences in how public as well as private sector banks adopted AI. The chi_square test resulted in a calculated value is (16.09) that is greatly larger than the critical value (3.84). Therefore, the test demonstrated statistically significant differences. Consequently, it confirmed that AI adoption was not uniform amongst the different types of banks. In particular, private banks had a significantly larger number of AI users than expected; whereas, public banks had a lower-than-expected number of users. The large deviations indicate fundamental structural and technological differences between the two banking systems. The Chi-Square test provided very strong evidence for supporting the alternative hypothesis that the observed differences in AI adoption were not simply due to random error but because of real differences in the adoption methods used by each sector. Thus, bank type was shown to be a key factor in determining the level of AI adoption within banks.

Table 6: T_Test for Satisfaction Level

Parameter	Mean	SD	n	t-value
Public	3.35	0.82	154	12.47
Private	4.45	0.65	135	12.47

A T-Test was applied to examine whether the there are differences in customer satisfaction rates in between banks of public & private were statistically significant. The T_value is (12.47) was ideally larger than the aforesaid critical value is (1.96), thus, private banks addresses quite higher customer satisfaction ratings showing from their efficient & AI-oriented services. Conversely, public sector banks shows that there are wide variations in customer experiences, which further indicates that their levels of service varied widely. Therefore, the results demonstrate that AI adoption leads to higher levels of customer satisfaction. Customers tend to favor banks with faster, smarter and more customized services. Therefore, improvements made to the implementation of AI will directly result in enhanced customer satisfaction.

Table 7: Index of AI Adoption

Factors	Awareness Level	Usage Level	Satisfaction Level	Perceived Efficiency	Overall
Public Banks (%)	61	57	66	63	61.75
Private Banks (%)	80	86	88	92	86.50

An AI Adoption Index was developed to provide a comprehensive comparative evaluation of both banking sectors. The average composite score for private banks was 86.50%; however, this was substantially less than

that achieved by public banks at 61.75%. Clearly, this demonstrates that private banks possess a strong lead over public banks regarding their overall digital transformation. Furthermore, each component of the index – awareness, usage, satisfaction and efficiency – consistently demonstrated superior performance by private banks. While public banks demonstrated relatively good performance in many aspects they lacked consistency throughout all dimensions. Overall, the index substantiates a considerable digital divide exists between public and private banks regarding their maturity in AI adoption. It may serve as a benchmark for public banks to pursue opportunities to increase their performance.

Table 8: Correlation Matrix & Analysis (Pearson's r)

Variables		X_1	X_2	X_3	X_4	Y
		Awareness of AI	Usage of AI Services	Perceived Efficiency	Ease of Use	Customer Satisfaction
X_1	Awareness of AI	1.00	0.68	0.61	0.59	0.64
X_2	Usage of AI Services	0.68	1.00	0.74	0.70	0.79
X_3	Perceived Efficiency	0.61	0.74	1.00	0.72	0.82
X_4	Ease of Use	0.59	0.70	0.72	1.00	0.75
Y	Customer Satisfaction	0.64	0.79	0.82	0.75	1.00

The correlation matrix disclosed that there is strong & positive associations among all the variables evaluated in the table 8, demonstrates that there is a close inter-connection among all AI-related factors. Customer satisfaction (Y) further demonstrated that the strongest & significant association with perceived efficiency (r = .82), highlighting that customer satisfaction levels are substantially enhanced when banks provide faster & accurate services to the customers. Similar kind of associations also exist with Usage (r = .79) & Ease of Use (r = .75), representing that customers consider both the accessibility as well as functionality of bank services. No negative associations exist in the results; thus, validating that all four dimensions of AI adoption contribute positively to customer satisfaction.

Multiple Regression Analysis

Model

$$\text{Customer Satisfaction (Y)} = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4$$

Table 9: Regression Coefficients

Variables		Co-efficient (β)	T_value	Sig. Level
Constant		0.85	—	—
X_1	Awareness of AI	0.22	4.33	Its Significant
X_2	Usage of AI Services	0.35	6.84	Its Significant
X_3	Perceived Efficiency	0.42	8.13	Its Significant
X_4	Ease of Use	0.28	5.66	Its Significant

Table 10: Model Summary

R	R^2	Adjusted R^2	F-value
0.88	0.78	0.78	131.50

Regression Analysis revealed a very strong association between AI related factors and customer satisfaction. The R Value (.88) indicates that there is a high degree of association between predicted levels of satisfaction and actual levels of satisfaction. Similarly, an R Squared Value of .78 illustrates that approximately 78 percent of the variability in customer satisfaction is attributable to AI related factors, which is extremely significant in social science research. Of the variables examined, Efficiency (B = .42) demonstrated the greatest impact, followed by Use (B = .35), Ease of Use (B = .28), and Awareness (B = .22). All T_Values associated with each independent variable are statistically significant; thus, providing empirical support for each contributing factor in the model. The F Value is (F=131.50) representing that the overall model is statistically sound & significant as per data. Such results assures that AI adoption is a key determinant factor in customer satisfaction in banking sector.

Table 11: Hypothesis Testing Results

Hypothesis Codes	Statements of Hypothesis	Test Used to Check Hypothesis	Calculated Values	Critical Values	Results	Decisions
$H0_1$	There is no significant differences exist by adopting AI in selected banks	Chi_square Test	16.08	3.84	Its Significant	$H0_1$ Rejected
$H1_1$	There is significant differences exists by adopting AI in selected banks	Chi_square Test	16.08	3.84	Its Supported	$H1_1$ Accepted
$H0_2$	There is no impact on satisfaction by adopting AI in selected banks	T_test	12.47	1.96	Its Significant	$H0_2$ Rejected
$H1_2$	There is high impact on satisfaction by adopting AI in selected banks	T_test	12.47	1.96	Its Supported	$H1_2$ Accepted
$H0_3$	Variables of AI don't significantly impact satisfaction collectively	Regression Analysis (F_test)	132.5	2.45	Its Significant	$H0_3$ Rejected
$H1_3$	Variables of AI significantly impact satisfaction collectively	Regression Analysis (F_test)	132.5	2.45	Its Supported	$H1_3$ Accepted

Findings of the study

- There was a clear distinction between how quickly AI technology was being used within public and private banks. The main reason why there were some significant distinctions between these two types of banks in terms of their AI technology adoption rates included; better financial capabilities of private banks to provide their employees with better equipment and software, greater flexibility to make decisions quickly, and more advanced infrastructure. Although public banks have shown progress in terms of adopting AI technology, they have struggled to keep up with private banks because of legacy systems and bureaucratic barriers. A chi square test supports the idea that there is a difference between the rates of adoption of public and private banks and that these are systemic and not random. The results of the t-test confirmed that satisfaction is no longer dependent on traditional service-related items. Instead, AI technology is now one of the most important determinants of customer perception and loyalty in the banking industry.
- In addition to identifying the significant relationship between AI technology adoption and customer satisfaction, regression analysis identified efficiency (β= .41) as the variable that had the largest effect on customer satisfaction. The fact that customers place the greatest emphasis on efficiency (speed, accuracy and reliability), further supports the argument that AI enabled automation will increase efficiency. In particular, the automation of processes increases the speed of completing tasks and decreases errors, thereby increasing overall efficiency. As such, it is logical that private banks exhibit higher levels of customer satisfaction. On the other hand, public banks continue to struggle with operating efficiently due to limited implementation of AI technology. Therefore, the findings from this study emphasize that improving efficiency must be the top priority for banks attempting to improve customer experience. Furthermore, the results support the growing trend toward real time digital banking.
- A correlation matrix analysis revealed a strong positive relationship existed between awareness, usage, efficiency and ease of use. Consequently, it would appear that implementing AI technology is not a separate issue from each individual aspect but a complex interrelated system. For example, when customers become aware of new technology they are likely to begin to utilize it. Once they are utilizing it they are likely to perceive that it is easier to use and ultimately believe it is more efficient. Because there were no negative correlations found in this study, it appears that all aspects of AI technology contribute positively to the overall goal of improved customer satisfaction. The results from this study further reinforce the notion that developing a holistic approach to implement AI technology is more effective than simply piecemeal approaches. Therefore, banks must develop strategies that incorporate all aspects of AI in order to maximize the effectiveness of their investments.
- Private banks demonstrated significantly higher levels across all four dimensions examined (awareness, usage, satisfaction and efficiency). According to the AI adoption index, there is approximately a 25% gap between private banks and public banks. In part, private banks utilized advanced analytics tools, easy-to-use applications, and personalized service to enhance customer experience. While public banks are continuing to improve, they currently are exhibiting average performance levels. This consistent superiority implies that private banks possess a competitive advantage in the digital age. Additionally, the superior performance levels imply that customers will eventually choose to bank with institutions that provide more technological sophistication.
- According to the regression model, R2 was .79 indicating that 79% of customer satisfaction was determined by the AI-related variables analyzed. This represents an extremely high degree of predictive power relative to similar studies concerning behavior. The fact that 79% of customer satisfaction can be attributed to AI technology adoption means that AI technology plays a major role in shaping customer perceptions. Conversely, only 21% of customer satisfaction can be attributed to issues outside the control of either party including human interaction or environmental issues.
- Nonetheless, the rate of transition is slow relative to private banks. Implementation costs associated with transitioning to an AI-based operation along with a lack of trained personnel and institutional inertia represent obstacles hindering the rapid development of public banks. Based upon the findings presented above, it appears

necessary for targeted investments and training programs aimed at improving employee skills coupled with policy-based initiatives to assist in facilitating the acceleration of AI technology adoption by public banks. Furthermore, it appears beneficial for public/private partnerships to exist to facilitate additional opportunities for accelerating the development and utilization of AI technology by public banks. Overall, while a disparity exists between private banks and public banks regarding AI technology adoption, it does not seem insurmountable if strategic efforts are implemented.

Conclusion and Suggestions

This study finds that private sector banks, compared to public sector banks, exhibit the largest advantages in terms of the implementation of Artificial Intelligence (AI), and therefore in terms of service efficiency and overall customer satisfaction in the Delhi NCR Region. Statistical tests, including Chi-Square Test, T-Test, Regression Analysis etc., show that the differences found among the banks are structural and significant rather than random. As an example, private banks were able to take advantage of new opportunities provided through AI technology to achieve enhanced operational efficiency, reduction in time required to provide service to the clients, provision of customized banking services to the clients and so on. All these efforts helped in increasing client loyalty and competitive position of private banks. Public sector banks on the other hand were making slow but gradual headway.

The key reasons for slow rate of progress of public sector banks include lack of sufficient financial resources, high costs associated with maintaining legacy system, and longer period required to make decisions. Moreover, this study found that customer satisfaction depends upon the extent of efficiency achieved through AI Technology. Therefore, there should be more emphasis placed on achieving speed, accuracy and smoothness in providing services to the clients. In order to bridge the current gap in terms of AI and digital technologies, public sector banks must invest much larger sums of money than they currently do. Public Sector Banks must have robust Information Technology Infrastructure in place to enable them to undertake advanced analytics, automation and real-time processing. Moreover, Employee Training Programs on AI and digital tools would assist in building internal competences and thus limit reliance on external vendors. In addition to above mentioned areas of improvement, there are many public sector bank customers who are still unaware about AI based services. Therefore, it is recommended that Public Sector Banks launch effective awareness campaigns and develop user friendly digital platforms for encouraging higher adoption and usage of AI based services. Lastly, collaboration with fintech companies and adoption of innovative practices may facilitate accelerated digital transformation in Public Sector Banks. Overall, a strategic, integrated and adequately funded approach towards implementation of AI is indispensable for public sector banks to remain competitive, enhance customer satisfaction and ensure long term growth in the emerging banking landscape.

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