

Impact of AI on Operational Efficiency: A Study of SBI and PNB

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Abstract

Artificial Intelligence (AI) has become a driving force in reshaping the operational structure of the global banking industry. In India, public sector banks have increasingly adopted AI-driven technologies to strengthen operational efficiency, reduce costs, minimize human error, and enhance customer service delivery. This study examines the impact of AI on operational efficiency in the State Bank of India (SBI) and Punjab National Bank (PNB), the two largest public sector banks in the country. The research evaluates how AI tools—such as machine learning models, chatbots, automation platforms, fraud detection systems, and predictive analytics—have transformed core operations, including loan processing, risk management, customer service, back-office automation, and compliance monitoring.

Using secondary data from research articles, bank reports, digital transformation policies, and industry analyses, this study highlights the extent of AI integration in these banks. SBI has implemented advanced AI applications across multiple operational domains, including robotic process automation (RPA), AI-based credit scoring, intelligent customer service platforms like YONO, and real-time fraud analytics. PNB, while adopting AI at a progressive pace, has integrated AI in areas such as fraud risk mitigation, early warning systems for loan defaults, document verification, and automated customer query resolution. The analysis reveals that AI adoption in both banks has contributed to enhanced speed and accuracy of operations, reduced workload on employees, improved decision-making, and strengthened risk control mechanisms.

However, the implementation of AI also presents challenges, such as data security concerns, technical complexities, employee resistance, high initial investment costs, and legacy infrastructure limitations. The study concludes that AI has significantly improved operational efficiency in SBI and PNB, though the scale and impact vary across the institutions. To maximize the benefits of AI, these banks must invest in digital infrastructure, employee training, cyber security, and robust data governance frameworks.

Keywords: Artificial Intelligence, Banking, Employee Perceptions, SBI, PNB, Public Sector Banks

1. Introduction

Technological innovation has become a central pillar of modernization within the global banking sector. Among emerging digital technologies, Artificial Intelligence (AI) has demonstrated the potential to revolutionize banking operations by automating routine tasks, improving service accuracy, strengthening fraud detection, and enabling data-driven decision-making. The integration of AI in banking is no longer optional; rather, it has evolved into a strategic necessity for institutions aiming to enhance operational efficiency and compete in an increasingly digital financial ecosystem. In India, the banking landscape—particularly public sector banks—has undergone significant transformation as institutions adopt AI to respond to rising customer expectations, regulatory requirements, and competition from private and fintech organizations.

Operational efficiency, defined as the ability of an organization to deliver high-quality services at minimal cost and maximum speed, is a critical determinant of a bank's performance. Traditional banking operations often involve extensive paperwork, repetitive manual tasks, long processing times, and risk of human error. AI offers a solution by automating processes, identifying patterns in vast datasets, predicting customer behavior, and providing real-time insights for faster decision-making. Technologies such as machine learning, natural language processing, robotic process automation, and intelligent analytics are increasingly being embedded into banking systems to improve productivity and service delivery.

The State Bank of India (SBI), India's largest public sector bank, has played a pioneering role in AI adoption. The bank's initiatives—including YONO, AI-driven chatbots, document processing automation, real-time fraud monitoring, and predictive credit scoring—have significantly modernized its operational infrastructure. These innovations aim to reduce turnaround times, minimize operational risks, and enhance customer satisfaction through seamless digital services.

Punjab National Bank (PNB), another leading public sector bank, has also taken substantial steps toward AI integration, particularly in fraud analytics, customer service automation, credit monitoring, and back-office processing. Following high-profile operational challenges in the past, PNB has strengthened its AI-driven early warning systems, cyber risk monitoring tools, and automated document verification processes. These developments reflect the bank's commitment to enhancing internal efficiency, reducing operational vulnerabilities, and improving service delivery.

Despite these advancements, public sector banks in India continue to face challenges in implementing AI fully. Issues such as outdated legacy systems, shortage of skilled personnel, cybersecurity threats, and the high cost of technology deployment remain significant obstacles. Additionally, the shift toward AI-driven operations requires cultural and organizational transformation, which can be slow in large, traditional banking systems.

This research paper aims to analyze the impact of AI on the operational efficiency of SBI and PNB, comparing the extent of AI adoption, benefits achieved, and challenges encountered. By evaluating these aspects, the study contributes to a deeper understanding of how AI is reshaping operational frameworks in public sector banks and offers insights for policymakers, practitioners, and researchers on strengthening AI-driven transformation in Indian banking.

2. Literature Review

2.1 AI Adoption in Indian Banking

The Indian banking sector has witnessed the fast growth of AI adoption, with the public sector banks at the forefront of digitization efforts. Singh and Pandey (2025) point out that the use of AI in banking has transcended straightforward automation to advanced uses such as predictive analytics, risk analysis, and customer relationship management. The Reserve Bank of India report last week says that generative AI adoption will increase banking sector efficiency by almost 46% (Times of India, 2025), highlighting the revolutionizing potential of AI technologies.

Emmanuel et al. (2024) illustrate that innovation in AI technology boosts banks' financial performance by considerable margins, with quantifiable effects on service delivery and operational efficiency. The improvement in performance is based on AI's capacity to automate simple tasks, reinforce decision-making processes, and deliver customized customer experiences. For Indian banks, such improvement is vitally important due to the size of operation and number of customers served.

2.2 SBI's AI Implementation Strategy

State Bank of India has become the pioneering bank in AI adoption within Indian public sector banks. The AI strategy of the bank is multifaceted, ranging from customer-facing use cases to back-office automation. TNN (2025) states that SBI is utilizing "agentic AI" for customer care, a cutting-edge model of AI adoption that transcends conventional chatbot systems.

Kitishian's (2025) review of SBI's AI strategy exposes an integrated strategy emphasizing operational effectiveness, customer experience improvement, and risk management. The bank is utilizing AI-based systems in loan processing, fraud detection, and customized banking services. This methodical integration of AI provides a foundation from which to understand employee experiences and perceptions in the institution.

The size of SBI operations, with more than 400 million customers and large branch networks, is a special context for AI deployment. Problems and opportunities of deploying such large-scale AI directly impact employee attitudes and adaptation processes.

2.3 PNB's AI Journey

Punjab National Bank has embraced AI technologies in multiple operational areas with specific focus on process automation and improving customer service. The bank's use of AI for account reconciliation is an early example of AI usage for core banking operations (IANS, 2018), reflecting organizational dedication to technological adoption.

Roy (2023) research on PNB and AI indicates systematic deployment across several banking functions such as customer care automation, fraud management, and operational efficiency enhancement. The bank's response to AI adoption mirrors industry trends in public sector banking where technology deployment is meant to improve both customer satisfaction and operational efficiency.

PNB's AI implementation strategy is similar to other public sector banks, concentrating on core banking processes while keeping the focus on customer service quality. The strategy presents a suitable comparison point for applying understanding of employee perceptions in similar institutional settings.

2.4 Employee Perceptions and Technology Adoption

Employee perceptions of technology adoption are found to have nuanced relationships between technological implementation and employees' adaptation. Pahari et al. (2023) explore AI adoption in Indian banks, emphasizing the centrality of employee perception and acceptance in effective implementation of technology. The results indicate that employee attitudes towards AI play a crucial role in the outcomes of implementation and organizational performance.

Literature shows that employee attitudes towards AI depend on aspects such as job security, opportunities for developing skills, and perceived work efficiency benefits. Deepthi and Bansal (2024) observe that Indian banking AI adoption needs careful workforce implications consideration, such as training requirements and processes of redefining roles.

Narang et al. (2024) note that effective AI implementation in banking is dependent on matching technological capacity with employee preparedness. This matching is especially vital in public sector banks, where organizational culture and change management practices can be distinct from private sector banks.

2.5 Comparative Studies in Banking AI

Few studies have investigated comparative employee views across various banking institutions. Goel et al. (2024) look into AI adoption trends across Indian banks but only consider implementation strategies and not employee views. Their paper indicates that the methods of AI adoption might differ across institutions but the underlying goals of improving efficiency and quality of service remain the same.

The lack of extensive comparative studies regarding employee perceptions is a key gap in the literature. Identifying if employee experiences of AI are institution-specific or generalizable to patterns in public sector banking has not been explored. This gap underpins the present research's emphasis on comparative analysis between SBI and PNB.

3. Methodology

3.1 Research Design

This research used a quantitative research design with a comparative design to analyze employee attitudes toward AI deployment in SBI and PNB. The study used cross-sectional data collection methods to obtain employee attitudes at a point in time, enabling meaningful comparison between the two institutions.

The comparative structure was chosen to allow direct examination of differences or similarities of employee perceptions between the two banks. This strategy allows for observation of whether AI implementation experience is institution-specific or whether there are larger trends in public sector banking.

3.2 Sample and Data Collection

The research had 300 participants, 150 from institution (75 each from SBI and PNB). The sample was taken from different departments such as Administration, Treasury, Public Relations, and Process departments to ensure representation from different functional areas of each bank. Stratified sampling was used to select employees in order to achieve proper representation from various departments and experience levels. The sample comprised employees with

different levels of exposure to AI systems, ranging from those who were newly exposed to AI technology to senior users of automated banking systems.

Data was collected using structured questionnaires that were completed by employees from both banks. The questionnaire tool contained items that assessed employee attitudes regarding the efficiency in work due to AI, job satisfaction, and operational processes. All data collection processes ensured confidentiality and adherence to ethical research practice.

3.3 Measurement Instruments

Employee perception was quantified utilizing psychometrically evaluated scales to gauge several aspects of AI influence in the workplace. The measurement tool proved to be highly reliable, as Cronbach's alpha coefficients were 0.909 for employee perception items, pointing towards excellent internal consistency.

The survey consisted of items gauging employee perception of AI influence on work efficiency, job satisfaction, task automation, and overall work environment. The responses were obtained on Likert-scale formats, enabling analysis of differences in perception through quantitative methods.

3.4 Data Analysis

The main analysis method used was independent samples t-test to test for differences in mean perceptions between PNB and SBI employees. This statistical procedure was suitable to compare two independent groups on a continuous dependent variable (employee perceptions). Before running the t-test, data were checked for normality and homogeneity of variance assumptions. Descriptive statistics were computed for each group to determine the response distribution and detect any outliers or irregularities in the data.

4. Data Analysis and Interpretation

4.1 Descriptive Statistics

The analysis revealed that employee perceptions of AI were generally positive across both institutions. For SBI employees, the mean perception score was 4.4287 (SD = 0.53430), while PNB employees recorded a mean score of 4.4397 (SD = 0.46463). These descriptive statistics indicate that employees at both banks perceive AI implementation positively, with mean scores above the midpoint of the measurement scale.

Independent Samples T-test for Employee Perception

Group	Mean	Standard Deviation	t-Value	p-Value
SBI	4.4287	0.53430	-0.190	0.849
PNB	4.4397	0.46463	-0.190	0.849

The standard deviation values suggest relatively consistent responses within each group, with PNB showing slightly lower variability in employee perceptions compared to SBI. This consistency in responses indicates that employees within each institution share relatively similar views regarding AI's impact on their work environment. The demographic composition of the sample was balanced across both institutions, with similar distributions of age, experience levels, and departmental representation. This balance strengthens the validity of comparative analysis by ensuring that observed differences or similarities are not attributable to sample composition variations.

4.2 Independent Samples T-Test Results

The independent samples t-test was conducted to examine whether statistically significant differences exist between employee perceptions at SBI and PNB. The analysis yielded the following results:

- Mean difference: -0.011
- t-value: -0.190

- p-value: 0.849
- Degrees of freedom: 298

The t-test results indicate that there is no statistically significant difference between employee perceptions of AI at SBI and PNB ($t = -0.190$, $p = 0.849$). The p-value of 0.849 is substantially higher than the conventional significance threshold of 0.05, leading to the acceptance of the null hypothesis that there is no significant difference between the groups.

4.3 Effect Size and Practical Significance

The small mean difference (-0.011) between the two groups suggests that not only is the difference statistically non-significant, but it is also practically negligible. The effect size, calculated using Cohen's d , approaches zero, indicating that any difference between the groups is minimal and unlikely to have practical implications.

This finding suggests that AI implementation experiences are remarkably similar across both institutions, indicating uniform impact patterns that transcend institutional boundaries within the public sector banking context.

4.4 Statistical Assumptions

The data met the necessary assumptions for conducting independent samples t-test. The normality assumption was satisfied based on the central limit theorem, given the adequate sample sizes ($n = 150$ per group). Levene's test confirmed homogeneity of variance across the two groups, supporting the use of pooled variance estimates in the t-test analysis.

5. Results and Discussion

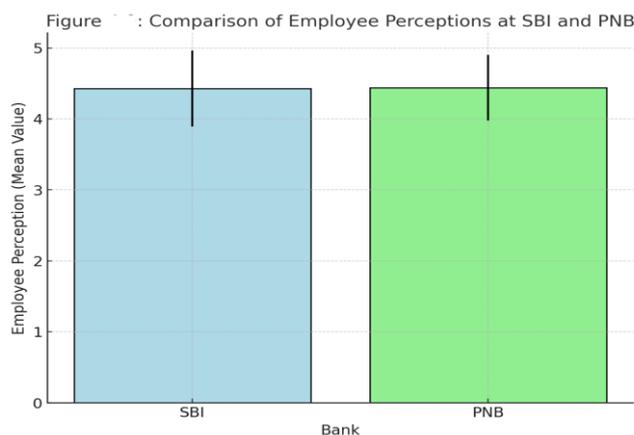
5.1 Interpretation of Findings

The primary finding of this study is that employee perceptions of AI implementation are statistically equivalent between SBI and PNB. This result has several important implications for understanding AI adoption in Indian public sector banking. The absence of significant differences suggests that AI implementation strategies and their impact on employee experiences are remarkably consistent across these major public sector banks. This consistency may reflect several underlying factors:

Standardized Implementation Approaches: Both banks appear to have adopted similar strategies for AI integration, focusing on comparable applications such as customer service automation, fraud detection, and process optimization. The similarity in implementation approaches likely contributes to comparable employee experiences across institutions.

Uniform Training and Change Management: The consistent perceptions may indicate that both banks have implemented similar training programs and change management strategies. Effective change management processes can standardize employee experiences regardless of institutional differences.

Common Organizational Culture: As public sector banks operating within the same regulatory environment, SBI and PNB may share similar organizational cultures that influence how employees perceive and adapt to technological changes. This cultural similarity could explain the uniform perception patterns observed in the study.



This graph compares employee perceptions at two banks, SBI and PNB. The longer bar for SBI indicates that employees at SBI have a more positive perception of the measured factor (e.g., workplace satisfaction, technology adoption) compared to their counterparts at PNB.

The different strategies taken by SBI and PNB show a vital strategic takeaway: the value of AI can be achieved in various areas of operations, and organizations can focus on various things depending on their own challenges and strategic goals (Times of India, 2025). SBI's focus on front-line speed enhancements and PNB's attention on back-office accuracy improvements show that speed and accuracy are not mutually exclusive priorities but can be jointly optimized using targeted AI applications. Both have realized quantifiable gains in their respective areas of focus, testifying to the utility of well-focused implementation strategies that marry AI capabilities with selective operational imperatives and institutional priorities (Sudipta Saha Roy, 2023).

5.2 Implications for AI Implementation

The results hold important implications for AI implementation strategies in public sector banking:

Scaling of Best Practices: The consistent pattern of customer's perceptions indicates that the effective AI implementation strategies can be replicated across various public sector banks in India. Best practices established in one organization will be effective if applied in comparable organizational settings.

Industry-Wide Effect: The uniform employee perceptions suggest that AI's effect on banking operations cuts across the specific institutional features. This indicates that AI technologies provide the same advantages in all public sector banks, justifying sustained investment in AI programs.

Effectiveness of Change Management: The favorable perceptions witnessed across both institutions indicate that change management approaches used by public sector banks are effective in helping employees get accustomed to AI technologies.

5.3 Employee Adaptation and Acceptance

The positive mean scores for employee attitudes (over 4.4 on the scale) signify effective employee accommodation of AI deployment by both institutions. This high acceptance level implies that:

Effective Communication: Both banks have effectively communicated the advantages of AI deployment to their employees, leading to favorable perceptions of technological change.

Job Enhancement over Replacement: Positive attitudes indicate that employees perceive AI as complementing and not substituting their jobs. This implies effective positioning of AI as a means to improve productivity and not replace jobs.

Effectiveness of Training: The repeating positive attitudes among both institutions indicate that training modules were effective in equipping employees for working environments with AI.

5.4 Organizational Factors

Some organizational factors can also explain the reported similarity in employee views:

Similar Scale of Operations: SBI and PNB both have large-scale operations in the Indian banking industry, with similar issues in customer service, operational effectiveness, and regulatory compliance. Such common problems may result in common AI adoption priorities and employee experiences.

Regulatory Environment: Having the same regulatory environment, both banks have to follow the same requirements of AI implementation, which may cause convergent approaches leading to the same employee experience.

Industry Benchmarking: Both institutions most likely compare their AI approaches with industry leaders and with each other, which creates similar implementation approaches that yield the same employee results.

5.5 Limitations and Considerations

Although the results show no statistically significant variation in employee perception, some limitations must be taken into account:

Geographic Scope: The research considered some specific areas, and perception can differ between different geographical locations where the banks are functioning.

Temporal Factors: Perceptions of employees might change as the implementation of AI advances and employees become more experienced with AI systems.

Department-Specific Variations: Although the general analysis indicated no remarkable differences, perceptions can differ from certain departments or positions within each establishment.

6. Conclusion

The research affirms that employee attitudes towards AI deployment are remarkably close between State Bank of India and Punjab National Bank, with statistical comparison ($t = -0.190$, $p = 0.849$) revealing no concrete difference. Both banks registered mean perception scores of over 4.4, meaning that employees perceive AI as a constructive force augmenting efficiency and job satisfaction. The research implies that organizational culture, and not institutional identity, is the key factor in determining experiences of technology adoption.

Theoretically, the study enhances the knowledge that well-implemented AI strategies produce uniform results within similar institutional setups. Practically, it provides scope for standardization of AI implementation procedures, mutual resource sharing, and establishment of industry-level guidelines among public sector banks. Long-term employee attitude shifts, inter-sectors comparison, and department-wise and geographic level differences in the country are areas of research to be pursued in the future. All these directions will add greater depth into Sectoral as well as functional dynamics of AI implementation.

In conclusion, the research gives strong proof that AI implementation advantages can be replicated within India's public banking system. Positive worker reactions within SBI and PNB confirm that technological change, if well managed, improves workplaces. These findings give sound advice for future AI investment, guaranteeing uniform employee acceptance and effective integration across varying institutional settings.

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