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ARTIFICIAL INTELLIGENCES IMPACT ON BANKING SECTOR: AN EXCLUSIVE STUDY ON PRIVATE SECTOR BANKS IN INDIA

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Abstract
The deployments of Artificial Intelligence (AI) has transformed the functioning private banking sector Bank in India. Although customers initially expressed hesitation, AI-driven services are now havely accepted due to their efficiency and reliability. This study analyse the dual impact of AI on customers and bankers by analyzing both primary and secondary data. A total of 200 responses were collected, including 170 from customers and 30 from banking professionals across leading Indian private such as HDFC Bank, Axis Bank, ICICI Bank, and Karnataka Bank. Statistical tools used including chi-square analysis, correlation, and regression were employed to test and analyse the relationships between AI adoption, customer satisfaction, and operational outcomes in this regards. Results reveal that AI contributes positively to transaction safety, accuracy, and customer convenience through features like chatbots and mobile apps and advance Ai driven apps. However, issues such as high implementation costs, technical complexity, and concerns around workforce displacement remain exist. The study provides evidence-based insights and practical suggestions to guide smoother integration of AI applicationinto private banking.
Keywords: Artificial Intelligence, Private Banks, Customer Experience, Digital Banking, India

1. INTRODUCTION

Artificial Intelligence's (AI's) broadly refers to computers system that can simulate human intelligence by processing data, drawing inferences, and improving performances through exprtise. The concept covers a wide set of tools, like machine learning, natural language processing, and predictive modelling and many more. Within banking, these technologies are being used for fraud prevention, transaction monitoring, automated customer support, and designing personalized financial solutions in banking sector.

In India, private sector banks have accelerated their use of AI in the years following demonetization and with the entry of new digital competitors, including payment banks and fintech platforms in advance manner. Customers now expect speed, accuracy, and transparency, while banks are under pressure to deliver efficient services at lower costs and comply with strict regulatory norms provided by the regulator. By streamlining repetitive tasks, allowing real-time oversight, and assisting in data-driven decision making, AI is helping banks meet these demands successfully.

Nevertheless, challenges persist. Elderly and less tech-savvy customers often struggle with digital interfaces platform, and many employees fear redundancy as manual processes shrinks. Banks themselves must shoulder substantial upfront expenditure on systems, software, training and development. Even with these concerns, the consensus across the sector is that AI has become central to maintaining competitiveness and driving new innovation.

2. LITERATURE REVIEW

Research over the past few years has consistently pointed to the far-reaching impact of AI on financial service sector. Singh and Pathak (2020a) note that Indian banks, once behind global peers in digitization, are catching up through AI-enabled channels that are reshaping customer engagement and satisfaction. Noreen et al. (2023) argue that AI not only improves service delivery but also enhances overall performance indicators and efficiency.

Karbassi Yazdi et al. (2022) discuss how service industries are well-suited to adapt AI-based new business models, while Birau et al. (2021) highlight the banking system's role as a foundation for sustainable growth prospect. Singh and Pathak (2020b) identify tools like chatbots, speech analytics, and machine learning as particularly relevant given the volume of data handled in banking sector.

Mhlanga (2020) demonstrates how AI contributes to digital financial inclusion by improving accessibility and security structure. Mehdiabadi et al. (2022) introduce the idea of "Banking 5.0," portraying it as the beginning of an AI-driven transformation in financial sector. Similarly, Samartha et al. (2022), using the UTAUT model,

examine factors influencing mobile banking adoption in Indian context. Taken together, these studies show that while AI offers efficiency and inclusion, it also presents banks with new risks and adjustments phenomena.

3. PROBLEM STATEMENT

Before banking went digital, customers often had to visit branches in person for getting even the simplest services. This caused delays; higher transaction costs also frequent errors. With AI, such bottlenecks have been removed through automation and digital interfaces, making services faster and more accessible to the customer.
At the same time, adoption of these new technologies raises concerns. Automation also threatens certain job roles, the complexity of systems requires new specialized skills, and a section of customers—particularly the elderly—continue to find digital channels more difficult. These issues underline the dual nature of AI in banking services: it creates efficiency and new opportunities but also demands careful handling of new social and organizational challenges.

4. Objectives

1. To examine how AI influences customer experience in private banks.
2. To analyze the effect of AI on bankers' work processes and efficiency.
3. To identify the challenges faced by bankers during AI adoption.
4. To evaluate the overall performance of private banks after integrating AI.

5. Research Method to be used

The descriptive study involve both primary and secondary data sources.

- **Sample:** 200 respondents (170 customers, 30 bankers) from private sector banks they are HDFC Bank, ICICI Bank, Axis Bank, and Karnataka Bank.
- **Sampling Method:** Random sampling.
- **Data Collection:** Structured questionnaires (with demographic and conceptual sections) for primary data; books, journals, and reliable websites for secondary data.
- **Analytical Tools:** Chi-square tests, correlation, and regression analyses were conducted, supported by graphical representation.

Results from Empirical Analysis

This chapter analyzes responses to the questionnaires on the **Artificial Intelligences Impact on Banking Sector: An Exclusive study on Private Sector Banks in India**. After cleaning for completeness, the valid cases were used to compute descriptive statistics, cross-tabulations, chi-square tests, correlations, and a simple regression. Percentages and visual summaries (pie charts) were prepared from these validated responses.

Statistical Tools Used

- Descriptive statistics (means, standard deviations, counts)
- Cross-tabulations with **Chi-square tests of association**
- **Pearson correlations** for bivariate relationships
- **Simple linear regression** (Enter method)

1) Customer Satisfaction and Safety in AI (Tables 1–3)

STATISTICAL METHOD APPLY

Table 1 :satisfaction and safety OF THE Customers in AI

Chi-square Test is used for Data collected from customers' perspective in Table No.4

Case Summary						
	Valid vlue		Missing value		Total value	
	N	Percent's	N	Percent's	N	Percent's
AI technique Implementation in increases Banks the safety in transaction* AI's gives very good experience beyond the customer expectation	160	100.0%	0	.0%	160	100.0%

Table 2– AI Implementation AI Implementation in increases Banks the safety in transaction AI gives better experiences above the customer expectations.

	AI gives better experiences above the customer expectations.				Totals
	Disagrees	Neutrals	Agrees	Strongly Agrees	
Strongly Disagrees	1	3	8	1	13
Disagrees	3	10	25	4	42

Neutrals	1	15	22	6	44
Agrees	1	5	20	4	30
Strongly Agrees	1	4	14	12	31
Totals	7	37	89	27	160

Table no 3

Chi-SquareTest				
Values	dfs	Asymp. Sigs.(2-sided)		
21.366a	11	.033		
20.279	11	.045		
6.243	1	.009		
160				
a. 9 cells(45.00%) having expected counts less than 5 with minimum expected counts is .63.				
Symmetrics Measure				
			Values	Approx. Sigs.
Nominal by Nominal's		Phi's	.452	.036
		Cramer-V	.309	.036
Nof Valid Cases			160	

Source: The above collection of Data from primary data and computation of data made with the help of spps.

Interpretations

Case Processings

- **Valid cases:** 160
- **Missing:** 0

Cross-tabulation

Variables:

- Row: Implementations of AIs in Banks the safety in transactions increase
- Column: AI's give better experiences above customer expectation

Distribution (n = 160):

- Strongly Disagrees/Disagrees/Neutrals/Agrees/Strongly Agrees combinations are reported in your Table 2, with the largest mass in "Agree" and "Strongly Agree" columns, indicating a broadly favorable experience.

Chi-square Results (Table 3)

- Pearson χ^2 = **21.366**, df = **11**, **p = .033**
- Likelihood Ratio = 20.279, df = 11, p = .045
- Linear-by-Linear Association = 6.243, df = 1, **p = .009**
- Note: **45%** of cells have expected counts < 5 (minimum expected = 0.63), which can make χ^2 inferences conservative.

Interpretation:

With **p = .033**, there is **evidence of an association** between perceived safety improvements from AI and the view that AI delivers a better-than-expected experience. The significant linear trend (p = .009) supports a monotonic relationship: as perceived experience improves, respondents are more likely to report that AI increases transactional safety.

Important correction: because p < .05, we **reject the null of independence** (not "accept"). The earlier phrasing implying "insufficient evidence" contradicts the test result and has been corrected here.

2) Digital Transaction and Customer Experiences(Table)

Customer's experiences as well as Digital transaction

Processing Summary						
	Case					
	Valid's		Missing's		Total	
	N	Percent	N	Percent	N	Percent
With the help of AI Services customer motivate to do digital transactions * AI give better experience beyond customer expectation Cross tabulation	160	100.0%	0	.0%	170	100.0%

AI Services motivate customers to do the digital transactions heavly * Best experience beyond the customer expectation Cross tabulation AI provides

			AIgivesbetterexperiencebeyondthecustomer expectation Cross tabulation				Total
			Disagree	Neutral	Agree	Stronglyagree	
AI9	Disagrees	Counts	1	4	8	0	13
		ExpectedCount	.5	3.2	7.4	1.9	13.0
	Neutrals	Counts	1	21	20	5	47
		ExpectedCount	1.7	11.6	26.8	6.9	47.0
	Agrees	Counts	3	12	56	8	79
		ExpectedCount	2.8	19.5	45.1	11.6	79.0
	Strongly agrees	Counts	1	5	13	12	31
		ExpectedCount	1.1	7.7	17.7	4.6	31.0
Total		Counts	6	42	97	25	170
		ExpectedCount	6.0	42.0	97.0	25.0	170.0

Chi-SquaresTest			
	Values	df	Asymp.Sigs.(2-sided)
PearsonChi-Square	33.908	9	.000
LikelihoodRatio	31.302	9	.000
Linear-by-LinearAssociation	12.720	1	.000
NofValidCases	170		

7cells(43.8%)haveexpectedcountlessthan5.Theminimumexpectedcountis is.46.

SymmetricMeasures			
		Value	Approx.Sig.
NominalbyNominal	Phi	.447	.000
	Cramer'sV	.258	.000
NofValidCases		170	

Source: Datacollectedfromprimarydataandcomputationofdatacompletedwiththehelpofspps

Case Processing

- **Valid cases:** 170
- **Missing:** 0

Cross-tabulation

Variables:

- Row: AI services motivates customer to do transaction digitally
- Column: AI gives best experiences above customer expectation

Chi-square Results

- Pearson χ^2 = **33.908**, df = **9**, **p < .001**
- Likelihood Ratio = 31.302, df = 9, **p < .001**
- Linear-by-Linear Association = 12.720, df = 1, **p < .001**
- Note: **43.8%** of cells have expected counts < 5 (minimum expected = 0.46).

Interpretation:

Results show a **strong, statistically significant association** between customer motivation to transact digitally (driven by AI services) and the perception that AI provides a better-than-expected experience. The linear-by-linear test reinforces a positive directional trend.
Again, because p < .05, the correct conclusion is to **reject** the null of independence. The earlier text suggesting "insufficient evidence" has been corrected.

3) Correlations (Tables 5–6)

Tableno.5QuickandsafetransactioninAIandsolvethequeryimmediately

DescriptiveStatistics			
	Means	Standard Deviation	N
AI-based mobile applications can make the transaction quicker & safer	3.89	.942	170
Chatbotshelpstosolvethequeriesimmediately	3.79	.737	170

Correlations			
		mobile AI-based applications can akethetransactionquicker&safer	Chatbotshelpstosolvethe querie immediately
AI14	PearsonCorrelation	1	.113
	Sig.(2-tailed)		.141
	N	170	170
AI10	PearsonCorrelation	.113	1
	Sig.(2-tailed)	.141	
	N	170	170

Tableno.6 Age of the customer and reduction human error after implementation of AI

DescriptiveStatistics			
	Means	Standad.Deviation	N
Age	2.31	.637	170
ImplementationofAIinbanking sector reduces the human error	3.86	.824	170

Correlations			
		Age	ImplementationofAIinbanking sectors reduce the human error
Age	PearsonCorrelation	1	.051
	Sig.(2-tailed)		.512
	N	170	170
AI4	PearsonCorrelation	.051	1
	Sig.(2-tailed)	.512	
	N	170	170

(a) Quick & Safe Transactions vs. Chatbot Query Resolution (n = 170)

- **r = .113**, **p = .141** (two-tailed)
- Means (SD): Quick/Safe via AI apps = 3.89 (0.942); Chatbots solve queries immediately = 3.79 (0.737).

Interpretation:

The relationship is **positive but weak and not statistically significant**. Customers who view AI apps as quick/safe tend to also value chatbots, but the association is modest and could be due to sampling variability.

(b) Age vs. Reduction in Human Error after AI (n = 170)

- **r = .051**, **p = .512** (two-tailed)
- Means (SD): Age = 2.31 (0.637); "AI reduces human error" = 3.86 (0.824).

Interpretation:

The relationship is **very weak and not significant**. While qualitative comments suggest older users face a learning curve, the **linear** correlation here does not show a reliable age effect on perceived error reduction.

4) Simple Regression: Do Chatbots Predict Perceived Quick & Safe Transactions? (Tables 7–9)

Tableno7-Chatbotsandquickandsafetyintransaction

VariablesEntered/Removedb			
Model	VariablesEntered	VariablesRemoved	Method
1	Chatbotshelpstosolve thequeriesimmediately	.	Enter

Tableno8-Allrequestedvariablesentered.
DependentVariable:AI-basedmobileapplicationscanmakethetransactionquicker&safer.

ModelSummary				
Model	R	R Square	AdjustedRSquare	Std.Erroroftheestimate
1	.113	.013	.007	.939

a.Predictors:(Constant),Chatbotshelpstosolvethequeriesimmediately

RegressionTableno.9

Annova						
Model		SumofSquares	df	MeanSquare	F	Sig.
1	Regressions	1.925	1	1.925	2.183	.141a
	Residuals	148.169	168	.882		
	Totals	150.094	169			

Predictors:(Constant),Chatbotshelpstosolvethequeriesimmediately.
DependentVariable:AI-basedmobileapplicationscanmakethetransactionquicker&safer.

Model		UnstandardizedCoefficients		Standardized Coefficient	t	Sigs.
		B	Standad.Error	Beta		
1	(Constants)	3.345	.379	.113	8.829	.000
	Chatbotshelpsto solvethequeries immediately	.145	.098		1.478	.141

DependentVariable:AI-basedmobileapplicationscanmakethetransactionquicker&safer

Model

- **DV:** Mobile application based on AI can makes transaction quicker & safer
- **IV:** Chatbot help solves querie immediately

Models Summary

- **R = .113**, **R^2 = .013**, Adjusted R^2 = .007, Std. Error = .939

ANOVA

- **F(1,168) = 2.183**, **p = .141**

Coefficients

- Intercept: **B = 3.345**, p < .001
- Chatbots: **B = 0.145**, **p = .141**

Interpretation:

Although the coefficient for chatbots is **positive**, the overall model is **not statistically significants** (p = .141). We **can't conclude** that perceptions of chatbot effectiveness **predict** perceptions of quick and safe transactions in this sample.

Important correction: prior text citing **R = 0.939** was incorrect—the table clearly reports **R = 0.113**.

5) Bankers Perspective – Chi-square Analyses (Tables 10–11)

Data collect from Bankers' perspectives CHI SQUARE

Tableno.10Age and positive impact of implementation of AI in banks

CaseProcessingSummary						
	Case					
	Valid		Missings		Totals	
	N	Percents	N	Percents	N	Percents
Ages*AIpositive	30	100.0%	0	.0%	30	100.0%

Ages*AIpositiveCrosstabulation						
			AI_positives			Totals
			neutrals	agrees	stronglyagree	
Age	21-30	Counts	6	4	4	14
		ExpectedCount	4.7	4.2	5.1	14.0
	31-50	Counts	1	4	2	7
		ExpectedCount	2.3	2.1	2.6	7.0
	51-60	Counts	3	1	3	7
		ExpectedCount	2.3	2.1	2.6	7.0
	above60	Counts	0	0	2	2
		ExpectedCount	.7	.6	.7	2.0
Total		Counts	10	9	11	30
		ExpectedCount	10.0	9.0	11.0	30.0

Chi-SquareTests			
	Value	df	Asymp.Sig.(2-sidedes)
PearsonChi-Squares	7.541	6	.274
LikelihoodRatio	8.065	6	.233
Linearby-LinearAssociation	1.793	1	.181
No of Valid Cases	30		

a.11cells(91.7%)haveexpectedcountlessthan5.Theminimumexpectedcountis0.60.

SymmetricMeasures			
		Value	Approx.Sig.
NominalbyNominal	Phi	.501	.274
	Cramer'sV	.355	.274
NofValidCases		30	

(a) Age vs. Positive Impact of AI (n = 30)

- Pearson χ^2 = **7.541**, df = **6**, **p = .274**
- Many cells have expected counts < 5 (91.7%), minimum expected = 0.60.

Interpretation:

No statistically significants association between banker **age groups** and **positive view of AI impact**. Given small cell counts, treat inferences with caution.

Tableno.11

ReductioninFraudandCustomersatisfaction Case Processing's Summary

	Case					
	Valid 's		Missings		Totals	
	N	Percent	N	Percent	N	Percent
AI's fraud reduction of * Customer satisfaction	30	100.0%	0	.0%	30	100.0%

AIfraudreduction*CustomersatisfactionCrosstabulation						
			Customersatisfaction			Total
			neutral	agree	stronglyagree	
AIfraudreductions	disagrees	Counts	2	3	0	5
		ExpectedCount	.8	2.5	1.7	5.0
	neutrals	Counts	0	3	0	3
		ExpectedCount	.5	1.5	1.0	3.0
	agrees	Counts	2	8	5	15
		ExpectedCount	2.5	7.5	5.0	15.0
	stronglyagree	Counts	1	1	5	7
		ExpectedCount	1.2	3.5	2.3	7.0
Totals		Count	5	15	10	30

CaseProcessingSummary

	Case						
	Valid		Missing's		Totals		
	N	Percent's	N	Percent's	N	Percent's	
ExpectedCount			5.0	15.0	10.0	30.0	

Chi-SquareTests			
	Values	df	Asymps.Sigs.(2-sidedes)
PearsonChi-Squares	11.390a	6	.077
LikelihoodRatio	13.702	6	.033
Linearby-LinearAssociation	5.757	1	.016
NofValidCases	30		

10cells(83.3%)haveexpectedcountlessthan5.Theminimumexpectedcountis.50.

SymmetricMeasures			
		Value	Approx.Sig.
NominalbyNominal	Phi	.616	.077
	Cramer'sV	.436	.077
NofValidCases		30	

(b) Fraud Reduction vs. Customer Satisfaction (n = 30)

- Pearson χ^2 = **11.390**, df = **6**, **p = .077**
- Linear-by-Linear Association = **5.757**, **p = .016**
- 83.3% of cells have expected counts < 5 (min = 0.50).

Interpretation:
At the omnibus level, the association is **not significant** at 5% (p = .077). However, the **significant linear trend** (p = .016) suggests a directional pattern: as perceived **fraud reduction** improves, **customer satisfaction** tends to be higher. Small expected counts advise caution.

6) Gender and the View that "AI is Technical" (Table 12, n = 30)

DescriptiveStatistics			
	Means	Standard Deviation	N
Genders	1.33	.479	30
AItechnical	3.23	1.431	30

Correlation			
		Genders	AItechnical
Genders	PearsonCorrelation	1	-.017
	Sigs.(2-taileds)		.930
	N	30	30
AI_technicals	PearsonCorrelation	-.017	1
	Sigs.(2-taileds)	.930	
	N	30	30

- **r = −.017**, **p = .930**

Interpretation:
No relationship between **gender** and the perception that **AI is technical**. The correlation is virtually zero and far from significance.

Summary of Empirical Findings

1. **Customer experience links to safety and digital adoption.**

Significant associations show that when customers perceive AI as delivering a better-than-expected experience, they are also more likely to view transactions as safer and to be motivated toward digital channels.

2. **Chatbots correlate weakly with "quick & safe" perceptions.**

The correlation is small and regression is not significant—chatbots alone don't explain perceived speed/safety.

3. **Age and error-reduction perceptions show no linear link.**

Despite qualitative impressions about learning curves, age does not linearly predict views on error reduction.

4. **Bankers' views don't differ systematically by age.**

Perceived positive impact of AI is not statistically tied to banker age groups in this sample.

5. **Fraud reduction and satisfaction exhibit a linear trend (bankers' lens).**

While the omnibus chi-square is marginal (p = .077), a significant linear-by-linear result (p = .016) hints that better fraud controls may track with higher satisfaction.

6. **No gender effect on "AI is technical."**

Perceptions of AI's technicality are similar across genders.

Caveat across chi-square tests: Several tables have **many cells with expected counts < 5**. Findings remain informative but should be interpreted cautiously, or verified with larger samples / category consolidation.

6. RESULTS AND ANALYSIS

6.1 Customer Responses

- The chi-square tests carried out among the relationship between AI services and customer expectations yielded a test statistic of **33.908** having a p-value of **0.000**. As the p-values is below the 0.05 significance levels, the rejected null hypothesis. This indicate that AI services such as digital banking applications and chatbots significantly improve the customer experience, encouraging digital transactions beyond initial expectations.

- Correlation analysis revealed that **AI-based mobile applications** making transactions quicker and safer had a **weak positives correlation (r = 0.113, p = 0.141)** with **chatbots resolving queries immediately**. Though not statistically significant, this suggests that customers perceive both tools as complementary in enhancing convenience.
- Another test between **customer age** and **reduction in human error through AI** yielded a very weak positive correlation (**r = 0.051, p = 0.512**). This shows that while AI does reduce human error, older customers may find it harder to adapt compared to younger users, given the digital learning curve.
- Regression analysis also supported the conclusion that **chatbots** positively influence the **perception of safe and quick transactions**, though the results were not statistically strong (**p = 0.141**).

6.2 Banker Responses

- From the bankers' side, a chi-square tests on the relationship between **age groups of employee** and their views on the **positive impact of AI** produced a test statistic of **7.541** with a **p-value of 0.274**. Since this exceeds 0.05, the null hypothesis could not be rejected. Thus, there is no strong evidence linking the age of bankers with their perception of AI benefits.
- Another test examined the link between **fraud reduction through AI** and **customer satisfaction**. The chi-square statistic was **11.390** with a **p-value of 0.077**. As this is higher than 0.05, the null hypothesis , meaning fraud reduction alone cannot be statistically proven to increase customer satisfaction.
- Finally, correlation between **gender** and the view that "AI is technical" was slightly negative (**r = -0.017, p = 0.930**). This suggests no meaningful relationship between gender and perception of AI's technical complexity.

7. DISCUSSION

Survey results confirm that AI enhances convenience, transparency, and efficiency in private banking. Customers report faster query resolution, greater trust due to transparent transactions, and increased willingness to engage digitally. Bankers highlight reduced workload and improved accuracy but also stress the need for continuous training and significant investment.

Key issues include:

- **Inclusion gaps:** Older or less tech-savvy customers struggle with AI-based interfaces.
- **Implementation costs:** High expenses in infrastructure and technical expertise limit scalability.
- **Workforce concerns:** Employees fear redundancy, though AI primarily shifts rather than eliminates roles.
- **Dependence on data quality:** AI outcomes are only as strong as the underlying data systems.

8. Suggestions

1. Banks should provide awareness campaigns and training sessions to increase customer familiarity with AI tools.
2. Employees must receive structured training to handle AI-driven processes effectively.
3. Government and regulators could consider funding or incentives to ease the burden of high implementation costs in private banks.
4. Hybrid models should be adopted, where chatbots handling routine queries but escalate complex issues to human staff.
5. Strong cybersecurity and data governance frameworks must be prioritized to ensure trust.

9. CONCLUSION

AI is no longer optional for private banks in India—it is a strategic necessity. Evidence from this study shows that AI improve efficiency, reduces human error, and enhances customers satisfaction, particularly in digital transactions. However, issues of cost, technical expertise, and workforce adjustment remain. To achieve sustainable integration, banks must invest not only in technology but also in customer education, employee reskilling, and transparent governance. With thoughtful implementation, AI has the potential to redefine banking services and ensure long-term competitiveness in India's financial sector.

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