



Impact of Artificial Intelligence on the Stock Market Performance of Commercial Banks in India

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ABSTRACT

Artificial Intelligence (AI) is a field of computer science dedicated to developing machines capable of performing tasks that normally require human intelligence. These tasks include learning from data, understanding and processing language, recognizing patterns, solving problems, and making decisions. From voice assistants like Siri and Alexa to personalized recommendations on Netflix and autonomous vehicles, AI is increasingly embedded in our daily lives. In the banking sector, AI serves multiple purposes that enhance operational efficiency, strengthen security, and improve the customer experience. By analysing transactions in real time, AI identifies suspicious behavior and prevents financial crimes. AI also enhances customer service through chatbots and virtual assistants that provide instant, around-the-clock support. In credit and lending, AI improves risk assessment by analyzing a broader range of data to determine creditworthiness more precisely. Present study deals with the impact of introduction of AI into the banking business the stock market performance of commercial banks in India. The study period is 10 years covering five years prior the introduction of AI and five years after the introduction of AI by the selected commercial banks in India



INTRODUCTION

Artificial Intelligence (AI) has rapidly evolved from a theoretical concept to a transformative force across numerous sectors, fundamentally altering the way societies function and businesses operate. AI refers to the capability of machines and computer systems to simulate human intelligence processes such as learning, reasoning, problem-solving, perception, and language understanding (Russell & Norvig, 2021). The advancement of computational power, access to big data, and improvements in algorithms has significantly accelerated the development and deployment of AI technologies in recent years (Goodfellow, Bengio, & Courville, 2016). The application of AI spans a broad range of fields including healthcare, transportation, manufacturing, and finance. In the financial sector, particularly, AI is revolutionizing traditional business models by automating routine operations, enhancing fraud detection, improving risk assessment, and personalizing customer services (Brynjolfsson & McAfee, 2017).

Artificial Intelligence (AI) is progressively transforming the Indian banking landscape, yielding significant enhancements in operational efficiency, customer engagement, risk management, and cost reduction. A comprehensive study across 128 Indian BFSI institutions revealed that 69% have adopted AI/ML solutions, resulting in a 30–40% reduction in operational costs and a 50% improvement in processing times (Gupta S, Shrivastavam U, 2025). Research involving 189 customers across SBI, Axis, PNB, and HDFC found that AI enhances accessibility and banking experience, but human interaction remains crucial to satisfaction (AsmatAraShaikh, Arya Kumar, Apoorva Mishra and Yasir Arafat Elahi, 2024). Comparative analysis between SBI and ICICI reveals ICICI's aggressive AI adoption—such as chatbots, predictive analytics, fraud detection, and RPA—led to superior financial performance metrics (ROA, ROE, Net Profit Margin) (Saurabh Kumar, 2025). AI aids fraud detection and risk assessment by analyzing transaction patterns, thereby enhancing real-time monitoring and reducing false positives (Hindu, 2024, Jan.6). Adoption of Generative AI in India's banking sector could boost overall efficiency by nearly 46%, as per a recent Reserve Bank of India report (Times of India, 2025, May 12). India's FinTech sector is heavily investing in AI, with 90% of financial institutions identifying AI and GenAI as the main catalysts for innovation (Economic Times, 2025, May 5).

AI is reshaping India's commercial banking sector by reinforcing operational efficiency, strengthening risk management, and boosting market confidence—factors that play a direct role in stock-market valuation. Adoption of advanced AI systems signals strategic maturity to investors, making banks more appealing assets

SCOPE OF THE STUDY



This research specifically examines the **impact of Artificial Intelligence (AI) on the stock market performance of the top five commercial banks in India**, selected on the basis of their market capitalization as of 01/09/2025. These banks represent a significant share of the Indian banking sector and serve as benchmarks for technology adoption and financial performance in the industry. The research aims to correlate with key stock performance indicators, including share price movements, market capitalization, trading volume and EPS. The study is limited to the period from ten years covering five years before and five years after the adoption of AI. The study does not cover the broader fintech sector or non-banking financial companies (NBFCs).

OBJECTIVE OF THE STUDY

The objective of the study is to examine the relationship between AI implementation and the stock market performance of commercial banks in India.

RESEARCH METHODOLOGY

This study adopts a **quantitative research design** with elements of **descriptive and analytical research**. The aim is to examine the relationship between the adoption of Artificial Intelligence (AI) and the stock market performance of selected commercial banks in India. The study seeks to identify trends, patterns, and potential causal relationships using empirical data. The sample banks are selected due to their significant role in the Indian financial system and relatively higher levels of technology adoption. The selected banks provide a reliable and representative sample for understanding AI's influence on stock market performance. The entire study is based on secondary data collected from books, journals, newspapers and websites like NSE, BSE etc.

LITERATURE REVIEW

Mor and Gupta (2021) explored the impact of AI adoption—such as chatbots, virtual assistants, and ATMs—on the technical efficiency of 47 Indian commercial banks. Using a stochastic frontier model, they found that AI deployment reduced technical inefficiencies by **11%**, particularly by enhancing operational decision-making and resource use. The study highlighted that AI functions as a complement to existing workflows without displacing the workforce.

Shanmugam, K. R., & Nigam, R. (2020) found that technology has a positive impact on the performance of only 3–9 banks over the six year period, while the most of the other banks are clustered in the low



technology and low performance state, showing no impact of technology on financial performance of these banks.

Impact of Artificial Intelligence on Stock Price Prediction in India (Bhunia, 2025) finds that AI models—particularly LSTM and hybrid approaches—outperform traditional forecasting methods in predicting stock prices using BSE data.

Ajith Kumar & Manchikatla (2025) compare SBI and ICICI’s performance pre- and post-AI adoption using the CAMEL framework and find improved financial outcomes post-AI deployment.

It is found from the above review of literature that none of the study directly links AI implementations to measures like stock price movements, trading volumes, or market capitalization for Indian banks.

DATA ANALYSIS AND INTERPRETATION

Table 1: Paired t-Test Results Comparing Share Price Movements Before and After AI Implementation

Name of the company	Mean (Before AI)	Mean (After AI)	Mean Difference	t-Statistic	df	p-Value
HDFC	1153.91	2750.75	-1596.84	-19.624	4	0.000
ICICI	1313.25	2736.58	-1423.33	-3.692	4	0.021
Kotak Mahindra	1726.17	3684.3	-1958.13	-8.814	4	0.001
Axis Bank	1045.99	1442.62	-396.63	-30.966	4	0.039
SBI	2552.6	3955.5	-1402.9	-2.675	4	0.056

Source: Compiled from financial statements of the companies

Table 1 show the paired t-test conducted to assess whether there is a statistically significant difference in the average share prices of five major Indian banks before and after the implementation of AI technologies.

All banks show **substantial positive movement** in average share prices after AI implementation. **ICICI**, and **Axis Bank** show **statistically significant increases** in share prices. HDFC and Kotak Mahindra show **highly significant increases**, indicating a strong positive market reaction to AI adoption. Even though there is positive move in the share prices of SBI after AI implementation, the result is not statistically significant at 5%.

Table 2: Paired t-Test Results Comparing Volume of trading Before and After AI Implementation

Name of the company	Mean (Before AI)	Mean (After AI)	Mean Difference	t-Statistic	df	p-Value
HDFC	40823762.6	84290489	-43466726.4	-1.525	4	0.202
ICICI	280636079.4	222988953.8	57647125.6	0.596	4	0.583
Kotak Mahindra	53547086.4	72213035.8	-18665949.4	-0.845	4	0.446
Axis Bank	148369947.2	154269982.8	-5900035.6	-0.242	4	0.821
SBI	331839328	449337952	-117498623.6	-0.955	4	0.394

Source: Compiled from financial statements of the companies

Table 2 presents the results of a paired t-test conducted to evaluate whether **the average trading volume** of five major Indian banks significantly changed **after the implementation of AI technologies**.

Although trading volume appears to have increased substantially after AI implementation at HDFC Bank, the result is **not statistically significant**. ICICI Bank experienced a decline in average trading volume after AI adoption, but the difference is **not statistically significant**, indicating that AI implementation likely did not influence trading volume in a consistent manner. Despite a moderate increase in trading volume of Kotak Mahindra Bank, the high p-value shows that the change is **not statistically significant**. The variation is within the range of normal trading behavior. Axis Bank shows **minimal change** in trading volume post-AI, and the result is clearly **not statistically significant**. SBI saw a noticeable rise in trading volume after AI implementation, but the p-value indicates that the increase is **not statistically significant**.

Table 3: Paired t-Test Results Comparing EPS Before and After AI Implementation

Name of the company	Mean (Before AI) ₹	Mean (After AI) ₹	Mean Difference	t-Statistic	df	p-Value
HDFC	42.426	63.56	-21.134	-2.5627	4	0.062
ICICI	49.874	13.478	39.396	2.2348	4	0.089
Kotak Mahindra	19.07	37.896	-18.826	-3.4916	4	0.025
Axis Bank	66.68	17.99	48.690	1.6800	4	0.168
SBI	53.94	13.578	40.362	0.9018	4	0.418

Source: Compiled from financial statements of the companies



Table 3 presents the results of paired t-tests conducted to assess whether the **Earnings Per Share (EPS)** of five major Indian banks significantly changed following the **implementation of AI technologies**.

Kotak Mahindra Bank is the **only company** showing a **statistically significant difference** in EPS before and after AI implementation. Interestingly, the **mean EPS decreased** after AI adoption, suggesting a potential negative impact on earnings or other operational factors influencing this trend. The post-AI mean EPS of HDFC Bank has increased, but the result lacks statistical significance. **EPS decreased** for **ICICI, Axis, and SBI**, but none of these decreases were statistically significant.

Table 4: Paired t-Test Results Comparing Market Capitalisation Before and After AI Implementation

Name of the company	Mean (Before AI) ₹	Mean /(After AI) ₹	Mean Difference	t-Statistic	df	p-Value
HDFC	41266438996	1.18094E+11	-76828086940	-3.508	4	0.025
ICICI	87584292608	1.24175E+11	-36591121507	-2.461	4	0.070
Kotak Mahindra	49123709647	1.15E+11	-65821156516	-3.002	4	0.040
Axis Bank	9.71E+10	97032057122	52783819.8	0.004	4	0.997
SBI	1.4246E+11	1.36738E+11	5722080741.8	0.424	4	0.848

Source: Compiled from financial statements of the companies

Table 4 presents the results of **paired t-tests** conducted to evaluate whether there were significant changes in the **market capitalisation** of five major Indian banks before and after the **implementation of AI technologies**.

HDFC and **Kotak Mahindra** experienced **statistically significant declines** in market capitalisation after AI implementation. These results suggest that AI implementation in these banks may have been perceived negatively by the market or coincided with other market-disruptive factors. **ICICI Bank** also shows a **notable drop** indicating a **marginal effect**—not statistically significant at the 5% level. **Axis Bank** and **SBI** reported **minimal or positive changes** in market capitalisation post-AI, with **very high p-values**, showing **no statistically significant impact**.



CONCLUSION

The results indicate that **AI implementation has had a positive impact** on the financial performance of Indian banks, particularly in terms of **share price appreciation and market capitalisation growth**. However, **the effects on earnings per share and trading volume were less consistent** and not statistically significant for most banks. Banks should continue investing in AI, but with a clear focus on **cost-benefit alignment and performance transparency**, to ensure that AI contributes not only to **market perception** but also to **sustainable profitability** and operational excellence.

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