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Does Adoption Of Ai Swell The Financial Performance Of Banks In India: A Comparative Study Of Sbi And Icici Using Balanced Panel Data

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Abstract
Banking sector is a major financial service sector that plays a significant role in economic growth of India. In today's world information and communication technological transformation essentiated banks to adopt artificial intelligence for their core operating activities to enhance the efficiency, faster and securable customer services under competitive edge. Banks are the major service sector. The present paper aimed at examine financial performance of banks in India pre and post adoption of AI by employing CAMEL model and various financial parameters. SBI from public sector banks and ICICI from the private sector banks being selected as sample for the study. The study period for the pre adoption of AI is 7 years (2010-2011 to 2016-2017) and post adoption of AI is 7 years (2017-2018 to 2023-2024). With help of SPSS, paired t test is used to assess the financial performance of selected banks before and after implementation of AI into the core banking operation. Finally, study found that the financial performance of selected banks have increased after adoption of artificial intelligence (AI) compared to before adoption of artificial intelligence (AI).

Key Words: *Artificial Intelligence, CAMEL Model, Balanced Panel Data, Technological Transformation.*

I. INTRODUCTION

The adoption of Artificial Intelligence (AI) in the banking sector is transforming how banks operate and compete, with significant effects on their financial performance. AI technologies, such as machine learning, automation, and data analytics, are helping banks improve customer service, reduce costs, enhance security, and make better financial decisions. These improvements are not only changing how banks interact with customers but also how they manage their resources and risks.

One of the key benefits of AI is its ability to automate repetitive tasks, such as processing loan applications, verifying documents, and handling customer inquiries. By reducing the need for manual work, banks can cut operational costs and allocate resources more efficiently. Additionally, AI-powered tools can analyze large volumes of data in real time, helping banks make faster and more accurate decisions, such as approving loans or detecting fraud, which can lead to increased revenues and reduced losses.

AI also plays a crucial role in improving customer satisfaction. With AI, banks can offer personalized financial services, such as tailored loan offers, investment advice, and spending insights, based on individual customer data. This level of customization can strengthen customer relationships, increase loyalty, and drive higher revenue.

However, the adoption of AI also presents challenges, particularly around data privacy, ethical concerns, and the need for significant investment in technology. Banks must carefully manage these issues to ensure the benefits of AI are realized without compromising customer trust or regulatory compliance.

II. NEED OF THE STUDY

The banking sector worldwide has witnessed a significant transformation in recent years due to rapid technological advancements. Among these, the adoption of artificial intelligence (AI) has emerged as a key

driver of innovation and efficiency. AI technologies such as machine learning, natural language processing, and predictive analytics are reshaping how banks operate, interact with customers, and manage risks. However, despite the increasing integration of AI in banking, there remains a significant gap in understanding its direct impact on the financial performance of banks, particularly in emerging markets such as India. Hence there is a need to address this gap by exploring the adoption of AI in the Indian banking sector and examining its effects on the financial performance of banks.

III. REVIEW OF LITERATURE

- Chatterjee et al. (2023) emphasized AI's impact on cost reduction and operational efficiency. The study observed that AI-driven automation in SBI lagged behind ICICI in terms of implementation scale, which reflects in their respective profitability metrics.
- Kumar and Singh (2022) examined financial indicators like Net Profit Margin and Return on Assets in AI-integrated operations. The results indicated significant improvement post-AI adoption, with ICICI outperforming SBI in leveraging AI-driven analytics.
- Jain & Rani (2022) analyzed the financial performance of SBI and ICICI before and after AI adoption. The study found that AI adoption significantly enhanced ICICI's profitability, particularly through better risk management, fraud detection, and customer personalization. On the other hand, SBI saw more gradual improvements, particularly in operational efficiencies, but its financial performance lagged behind ICICI in terms of profitability.
- Reddy & Seshadri (2022) focused on the impact of AI on NPAs in Indian banks. Their study showed that AI's predictive analytics and automated loan assessment systems helped reduce NPAs by improving risk assessments in loan origination, leading to better asset quality. ICICI saw a more significant reduction in NPAs compared to SBI, due to its early adoption of AI in credit risk management.
- A report by PwC (2022) identified AI as a critical driver of customer retention through personalized banking experiences. The study noted ICICI's AI chatbots and fraud detection systems have strengthened its market positioning, yielding better financial outcomes.
- Chaudhary & Sharma (2021) explored the role of AI-powered chatbots and virtual assistants in enhancing the customer experience. They found that ICICI Bank, which had a quicker rollout of AI-powered customer service tools, enjoyed higher customer satisfaction and loyalty, contributing to financial gains.
- Ghosh and Banerjee (2021) highlighted that AI adoption leads to better predictive modeling in risk assessment and personalized financial services, impacting the financial performance of banks significantly. The study focused on Indian banks and noted a marked improvement in operational metrics post-AI adoption.
- Patel & Kapoor (2020) the study indicated that while AI adoption improved customer engagement and satisfaction, it had a more modest impact on financial performance metrics in SBI compared to ICICI, which had already integrated AI into several core operations.

IV. RESEARCH GAP

As per review made on previous research concern to present study, most studies focused on general digital transformation and its impact on banking performance but few studies have taken place on impact of Adoption of AI on the banking performance. But there is a lack of longitudinal research examining how AI adoption influences financial performance of SBI and ICICI using CAMEL model during pre and post adoption AI these banks. Hence, the study is needed to fill the existing research gap.

V. OBJECTIVES OF THE STUDY

The following are the major objectives of the study

- ❖ To analyse the trends in financial performance of SBI and ICICI banks during pre and post adoption of AI.
- ❖ To Compare the financial performance of SBI during pre and post adoption AI using camel model,
- ❖ To Compare the financial performance of ICICI during pre and post adoption AI using camel model,

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VI. HYPOTHESES

The following hypothesis are formulated to test the above objectives

1. H_0: The no statistical significance difference in financial performance of SBI and ICICI during the pre and post adoption of AI.

VII. RESEARCH METHODOLOGY

a. Source of the data

The present study is based on secondary. The required data for the study is collected from annual reports of SBI and ICICI bank, money control website, various research papers and RBI official website.

b. Sampling Method

Purposive sampling method chosen for the study and selected SBI bank from public sector banks and ICICI from private sector bank due to their market size and early adoption of AI into their business.

c. Statistical Tools Used

For the study trend analysis is employed to summarize the financial performance of selected banks and paired t-test is utilized to test the significance difference of financial performance of SBI and ICICI during pre and post adoption of AI.

d. Study Period

The study period is constricted to 14 years. Further, it is divided in to pre adoption of AI (2010-2022 to 2016-2017) and Pre adoption of AI (2017-2018 to 2023-2024)

e. Scope of the Study

1. The study is restricted to SBI and ICICI bank.
2. The result of the study not generalized to other public and private sector banks.
3. This study conducts a comparative analysis between a public sector bank (SBI) and a private sector bank (ICICI), focusing on financial outcomes, and overall performance.

VIII. DATA ANALYSIS AND DISCUSSION

A. Capital adequacy is a measure of a bank's financial strength, stability, and its ability to absorb potential losses. It ensures that the bank has sufficient capital to cover its risks and protect depositors' money while maintaining overall confidence in the banking system. The measure the capital adequacy of SBI and ICICI pre and post AI, capital adequacy ratios are incorporated in the following table-1

Table-1: Capital Adequacy

Years	Capital Adequacy							
	SBI				ICICI			
	CAR	Debt to Owners Fund Ratio	Advances to Assets Ratio	Advances to Loans Funds	CAR	Debt to Owners Fund Ratio	Advances to Assets Ratio	Advances to Loans Funds
Post AI								
2010-11	11.98	16.21	61.83	77.19	19.54	7.28	53.26	68.53
2011-12	13.86	13.94	64.96	78.01	18.52	6.55	53.57	69.44
2012-13	12.92	13.87	66.75	82.25	18.74	6.57	54.07	69.64
2013-14	12.96	13.34	67.48	82.04	17.7	6.65	56.96	73.26
2014-15	12	13.87	63.47	77.39	17.02	6.64	59.98	75.94
2015-16	13.12	14.24	62.08	76.31	16.64	6.86	60.39	77.02
2016-17	13.11	15.08	58.05	71.15	17.39	6.58	60.15	75.25
Post AI								
2017-18	12.6	15.79	56	71.25	18.42	7.28	58.28	74.18

2018-19	1.72	16.89	59.38	68.49	16.89	7.77	60.8	75.11
2019-20	13.13	15.87	58.84	67.69	16.11	8.24	58.75	73.66
2020-21	13.74	16.47	54	64	19.12	7.09	59.63	74.95
2021-22	13.85	16.08	54.81	63.76	19.16	7.01	60.86	78.24
2022-23	14.68	15.07	57.98	68.11	18.34	6.57	64.36	82.5
2023-24	14.28	14.47	59.93	71.02	6.33	6.6	63.28	83.47

Source: Banks Official Source and Money Control Website

Table-1 shows capital adequacy under CAMEL model of SBI and ICICI bank during pre and post adoption of AI. The analysis of table is as follows

Pre adoption of AI (2010-2017) Capital Adequacy Ratio (CAR) of SBI fluctuates between 11.98% and 13.86% during this period. This reflects a stable but modest capital base, indicating the bank's relatively conservative risk appetite and adherence to regulatory requirements. The CAR is well above the minimum regulatory threshold of 9%, showcasing a solid capital foundation.

Post adoption of AI (2017-2024) sees a significant dip to 1.72%, which is a sharp outlier and suggests a crisis or significant operational restructuring during this time.

From 2019-2024, the CAR improves and stabilizes at around 13%, reaching 14.28% in 2023-2024. The AI-driven improvements likely helped restore capital adequacy, indicating better risk management and the ability to absorb financial shocks.

CAR of ICICI, pre- adoption of AI (2010-2017) is remained robust, consistently above 16%, with a high of 19.54% in 2010-2011. This indicates a strong capital base, suggesting that ICICI had a more aggressive approach to risk management during this period, allowing for a higher capital buffer.

Post adoption AI (2017-2024) The CAR of ICICI drops significantly in 2023-2024 to 6.33%, signaling a substantial decline. This may indicate that ICICI adopted a more aggressive lending strategy in the post-AI period, leading to a reduction in capital reserves relative to assets. The AI-powered systems might have helped ICICI to expand its lending rapidly, but this shift exposes the bank to greater capital adequacy risks.

The Debt to Owners Fund Ratio of SBI before adoption of AI starts at 16.21 and decreases over time, reaching 13.11 in 2016-2017. This indicates that SBI reduced its reliance on debt financing in favor of equity and retained earnings, aligning with its cautious risk management approach.

Post adoption of AI the ratio increases to 15.79 in 2017-2018 but declines again to 14.47 in 2023-2024. The AI-driven strategies may have allowed SBI to better optimize debt management, reducing reliance on debt while still supporting growth.

Pre adoption of AI the ratio of ICICI starts at 7.28 in 2010-2011 and gradually decreases to 6.58 in 2016-2017, reflecting a low and stable reliance on debt. This is consistent with ICICI's strong capital structure and effective debt management practices.

Post adoption of AI the ratio stabilizes at 6.60 in 2023-2024, showing that ICICI continued to maintain a conservative debt structure, despite aggressive lending activities post-AI.

The advances to asset ratio of SBI during pre-adoption of AI shows a gradual decline from 61.83% in 2010-2011 to 58.05% in 2016-2017. This decrease suggests that SBI became more conservative in its lending relative to its total assets during this period, possibly reflecting a shift toward asset diversification or higher risk aversion.

Post adoption of AI the advances to asset ratio recovers to 59.93% in 2023-2024, indicating that the bank increased its lending activity post-AI, aligning with digital transformation and AI-enhanced decision-making tools that could optimize credit risk assessment.

ICICI's ratio starts lower at 53.26% and gradually increases to 60.15% by 2016-2017 during pre-adoption of AI, signaling that the bank gradually increased its lending relative to assets during this period.

The ratio continues to increase during post-AI, peaking at 64.36% in 2022-2023 and stabilizing at 63.28% in 2023-2024. This suggests that ICICI has been more aggressive in expanding its loan portfolio as a percentage of total assets, supported by AI-powered loan analytics.

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B. Asset Quality Analysis

Asset quality in bank plays a significant role in assessing the financial stability and risk management capacity of it. To examine the asset quality of the bank's asset quality indicators such as Gross NPA, Net NPA, Net NPA To Advances and Net NPA to Total Assets taken for the study.

Table-2: Asset Quality Ratios

Years	Asset Quality Ratios							
	SBI				ICICI			
	Gross NPA	Net NPA	Net NPA To Advances	Net NPA to Total Assets	Gross NPA	Net NPA	Net NPA To Advances	Net NPA to Total Assets
Pre-AI								
2010-11	3	1.63	2	1	0	1.11	1	0.59
2011-12	5	1.82	2	1.18	0	0.73	1	0.39
2012-13	5	2.1	2	1.4	0	0.77	1	0.42
2013-14	5	2.57	3	1.73	0	0.97	1	0.55
2014-15	4	2.12	2	1.35	4	1.61	2	0.96
2015-16	7	4	4	2.37	6	2.98	3	1.79
2016-17	7	3.71	4	2.15	9	5.43	5	3.26
Post-AI								
2017-18	11	5.73	6	3.20	0	5.43	5	3.16
2018-19	8	3	3	17.90	7	2.29	2	1.39
2019-20	6	2.23	2	1.31	6	1.54	2	0.9
2020-21	5	1.5	2	0.81	8	2.1	2	0.74
2021-22	3.97	1.02	1.02	0.56	4	0.81	1	0.49
2022-23	2.78	0.67	0.67	0.388	2.87	0.51	0.51	3.25
2023-24	2.24	0.57	0.57	0.34	2.26	0.45	0.45	0.78

Source: Banks Official Source and Money Control Website1. Gross NPA (Non-Performing Assets)

Gross NPA of SBI rose from **3**% in 2010-11 to **7**% in 2016-17.The steady rise indicates deteriorating asset quality due to weaker credit appraisal and monitoring. Gross NPA peaked at **11**% in 2017-18 before showing a continuous decline, reaching **2.24**% in 2023-24. This decline reflects the effectiveness of AI systems in loan management, early NPA detection, and recovery processes.

Pre-AI ICICI Maintained lower Gross NPA from 0% to 9%**,** suggesting better risk management practices. Post-AI**,** Gross NPA dropped from 5.43% in 2017-18 to 2.26% in 2023-24, reflecting enhanced AI-driven credit monitoring.

Net NPA of SBI during Pre-AI rose from 1.63% in 2010-11 to 3.71% in 2016-17.This indicates a lag in recovering stressed assets and increased provisioning requirements. Post-AI Net NPA spiked to 5.73% in 2017-18 but fell to 0.57% by 2023-24, showing improvements in recovery mechanism**.** Pre adoption of AI ICICI Maintained lower Net NPA levels, with a peak of 5.43% in 2016-17**.** Post adoption of AI **d**ropped from 5.43% in 2017-18 to 0.45% in 2023-24, indicating a consistent improvement.

Net NPA to Advances Ratio of SBI remained around 2% to 4% from 2010 to 2017 during pre-adoption of AI. After post adoption of AI dropped significantly from 6% in 2017-18 to 0.57% in 2023-24, signaling effective credit control through AI.

Net NPA to Advances ratio of ICICI before adoption of AI **f**luctuated between 1% and 5% and after p**ost** AI reduced from 5% in 2017-18 to 0.45% in 2023-24.

ICICI consistently performed better in maintaining a lower Net NPA to Advances ratio, but SBI's dramatic post-AI improvement underscores the impact of technology in mitigating credit risks.

Net NPA to Total Assets Ratio of SBI before adoption of AI Increased steadily from 1% in 2010-11 to 2.37% in 2015-16 and post-AI shown **s**harp fluctuation in 2018-19 (17.9%), followed by a steady reduction to 0.34% in 2023-24.

ICICI shown a stable and consistently lower, around 0.39% to 1.79%. Improved from 3.16% in 2017-18 to 0.78% in 2023-24.

C. Management Efficiency

To anatomize the management efficiency of SBI and ICICI pre and post adoption of AI management efficiency indicators in table considered for the study period.

Table: 3 Management Efficiency

Years	Management Efficiency											
	SBI						ICICI					
Pre-AI	Business Per Employee	Net Profit/ Employee (Rs.)	Interest Income/ Employee (Rs.)	Interest Income/ Branch (Rs.)	Net Profit/ Branches (Rs.)	Business/ Branches (Rs.)	Business Per Employee	Net Profit/ Employee (Rs.)	Interest Income/ Employee (Rs.)	Interest Income/ Branch (Rs.)	Net Profit/ Branches (Rs.)	Business/ Branches (Rs.)
2010-2011	75,836,787.78	330,608.20	3,651,068.43	59,420,618.92	5,380,601.33	1,234,232,925.24	77,580,440.08	904,241.99	4,559,331.00	102,704,835.11	20,369,221.83	1,747,599,877.82
2011-2012	88,695,813.20	543,309.55	4,943,426.72	74,647,129.22	8,204,126.56	1,339,331,641.49	87,382,046.47	1,109,420.21	5,755,826.10	121,884,637.35	23,492,940.41	1,850,391,039.24
2012-2013	98,484,254.10	617,837.58	5,241,313.86	79,760,764.56	9,402,069.66	1,498,704,257.70	93,911,715.27	1,341,411.86	6,457,036.48	129,276,119.03	26,856,363.55	1,880,203,421.94
2013-2014	116,882,048.03	488,812.02	6,119,627.30	85,922,744.91	6,863,174.55	1,641,084,645.54	92,849,708.72	1,358,302.69	6,116,655.05	117,714,236.08	26,140,359.71	1,786,880,645.35
2014-2015	134,911,208.97	614,410.75	7,146,806.58	93,306,235.35	8,021,534.32	1,761,354,091.65	112,938,140.26	1,684,887.74	7,401,381.02	121,212,691.11	27,593,468.89	1,849,592,105.93
2015-2016	153,770,974.81	478,997.86	7,894,439.54	97,711,092.41	5,928,654.49	1,903,254,798.38	118,696,176.03	1,347,597.82	7,307,161.04	118,515,583.82	21,856,825.39	1,925,145,282.02
2016-2017	172,538,127.46	500,274.50	8,375,280.48	102,223,785.91	6,106,058.59	2,105,899,694.70	115,193,098.71	1,183,120.75	6,537,376.34	111,662,431.55	20,208,434.23	1,967,569,379.38
Post-AI												
2017-2018	175,776,620.83	-247,971.10	8,350,949.88	98,375,709.65	-2,921,144.69	2,070,680,589.85	129,753,214.80	819,281.33	6,644,491.59	112,935,878.78	13,925,257.65	2,205,404,754.67
2018-2019	0	0	0	0	0	0	142,868,072.08	387,642.38	7,307,399.77	130,080,411.57	6,900,495.69	2,543,221,694.30
2019-2020	223,169,169.33	580,806.85	10,315,720.80	116,220,402.06	6,543,566.51	2,514,299,397.05	142,596,981.88	798,519.16	7,531,118.58	140,492,705.86	14,896,341.85	2,660,140,804.47
2020-2021	249,571,543.11	830,869.25	10,793,750.26	119,335,088.80	9,186,043.21	2,759,248,782.89	168,734,303.89	1,639,765.48	8,011,976.81	150,243,583.36	30,749,495.06	3,164,168,725.60
2021-2022	277,809,650.59	1,296,867.16	11,277,678.21	123,712,067.91	14,226,165.68	3,047,471,802.57	181,738,412.40	2,205,083.96	8,160,551.87	159,421,456.63	43,077,686.78	3,550,372,927.65
2022-2023	323,204,939.97	2,129,775.27	14,080,635.81	148,227,208.30	22,420,197.99	3,402,386,553.49	173,731,170.26	2,518,276.98	8,623,980.58	185,137,861.02	54,061,857.97	3,729,625,427.97
2023-2024	371,080,329.55	2,629,258.37	17,870,762.11	184,158,750.55	27,094,587.97	3,823,994,154.60	184,189,047.56	2,899,692.18	10,133,462.54	219,057,093.36	62,683,227.66	3,981,651,603.10

Source: Banks Official Source and Money Control Website

Pre-AI, SBI's BPE (Business per Employee) grew steadily, with the average for the period around ₹120 million. Post-AI adoption, BPE surged significantly, reaching ₹371 million by 2023-24, indicating a robust 117% increase.

ICICI Bank's BPE also showed improvement from an average of ₹99 million during the Pre-AI phase to ₹184 million in 2023-24, reflecting a 60% increase. Although ICICI started from a stronger baseline than SBI, SBI's post-AI growth was more pronounced.

SBI faced challenges in the Pre-AI period with NPE (Net Profit per Employee) averaging ₹510,000. However, post-AI adoption, SBI recovered and surged to ₹2.63 million in 2023-24, marking a 126% growth.

ICICI Bank maintained relatively high NPE during the Pre-AI phase, averaging ₹1.1 million. Post-AI, ICICI's NPE climbed to ₹2.89 million, showing 35% growth. Despite ICICI's stable pre-AI performance, SBI's AI-driven recovery and growth rate outpaced ICICI in the post-AI period.

SBI's IIPE (Interest income per employee) averaged around ₹6.3 million during the Pre-AI phase. Post-AI adoption, this rose to ₹17.8 million in 2023-24, an 81% increase, highlighting improved credit efficiency and

lending management.

ICICI Bank's IIPE grew more modestly, from ₹6.1 million in the Pre-AI period to ₹10.1 million post-AI, a 35% increase. While both banks showed growth, SBI's post-AI efficiency in generating interest income per employee was markedly superior.

SBI's IIPB (Interest income per branch) grew steadily from ₹84 million pre-AI to ₹184 million in 2023-24, showing a 53% increase. This growth reflects improved operational efficiency at the branch level.

ICICI Bank's IIPB increased from ₹117 million to ₹219 million during the same period, a 33% growth. Though ICICI started at a higher base, SBI's post-AI growth trajectory in branch-level income generation was steeper.

SBI faced a decline in NPB (Net profit per branch) during early post-AI years, recording losses in 2017-18. However, it recovered to ₹27 million by 2023-24, achieving a 61% increase from its Pre-AI average.

ICICI Bank's NPB grew consistently from ₹24 million to ₹62 million, a 32% rise, reflecting steady profitability. While both banks improved, SBI's rebound post-AI was more substantial.

In terms of BPB (Business per branch), SBI experienced growth from ₹1.58 billion in the Pre-AI phase to ₹3.82 billion by 2023-24, a 95% increase, indicating strong expansion in branch operations.

ICICI Bank showed similar growth, with BPB rising from ₹1.83 billion to ₹3.98 billion, a 96% increase. Both banks demonstrated robust scaling of business operations at the branch level, with almost equal growth rates.

D. Earning Capacity

To examine the earning capacity of SBI and ICICI banks before and after the adoption of AI, the indicators considered are Dividend Per Share (DPS), Net Profit per Share (EPS), Net Profit Margin, Return on Capital Employed (ROCE), Return on Assets (ROA), and Return on Equity (ROE). The goal is to assess how AI adoption has influenced their earning capacity and overall financial health.

Table-4 : Earning Capacity

Years	Earning Capacity											
	SBI						ICICI					
Pre-AI	Dividend Per Share	Net Profit/Share (Rs.)	Net Profit Margin	ROCE (%)	Return on Assets	Return on Equity / Networth (%)	Dividend Per Share	Net Profit/Share (Rs.)	Net Profit Margin	ROCE (%)	Return on Assets	Return on Equity / Networth (%)
2010-2011	30	116.07	9.05	2.26	0.6	11.34	14	44.72	19.83	2.31	1.26	9.35
2011-2012	35	174.46	10.99	2.51	0.87	13.94	16.5	56.08	19.27	2.27	1.36	10.7
2012-2013	41.5	206.2	11.78	2.11	0.9	14.26	20	72.17	20.77	2.61	1.55	12.48
2013-2014	3	14.59	7.98	1.89	0.6	9.2	23	84.94	22.2	2.96	1.64	13.39
2014-2015	3.5	17.5	8.59	2.06	0.63	10.2	5	19.27	22.76	3.2	1.72	13.89
2015-2016	2.6	12.82	6.06	1.96	0.42	6.89	5	16.72	18.44	3.47	1.26	11.19
2016-2017	2.6	13.15	5.97	1.99	0.38	6.69	2.5	16.82	18.09	3.59	1.26	10.11
Post-AI												
2017-2018	0	-7.34	-2.96	1.81	-0.18	-3.37	1.5	10.54	12.33	2.91	0.77	6.63
2018-2019	0	0.97	0.35	0.00	0.02	0.39	1	5.22	5.3	2.52	0.34	3.19
2019-2020	0	12.25	10.6	1.79	0.36	6.95	0	12.25	10.6	2.67	0.72	6.99
2020-2021	2	23.41	20.46	1.64	0.45	8.86	2	23.41	20.46	3.1	1.31	11.21
2021-2022	5	33.58	27.02	1.42	0.63	12.33	5	33.58	27.02	2.92	1.65	13.94
2022-2023	8	45.67	29.2	1.59	0.91	16.75	8	45.67	29.2	3.27	2.01	16.13
2023-2024	10	58.22	28.61	1.47	0.98	17.46	10	58.22	28.61	3.27	2.18	17.37

Source : Banks Official Source and Money Control Website

SBI experienced a significant decline in DPS (Dividend per share) from ₹30 in 2010-11 to ₹2.6 in 2016-17 during the pre-AI period, reflecting financial strain. Post-AI, it showed a gradual recovery, reaching ₹10 in 2023-24, indicating improved cash flow and profitability.
ICICI saw fluctuating DPS pre-AI, peaking at ₹23 in 2013-14 but dropping to ₹1.5 in 2017-18. Post-AI, DPS steadily improved, matching SBI at ₹10 in 2023-24, showcasing its enhanced financial position.
SBI faced a drastic drop in EPS (Earning per share) from ₹116.07 in 2010-11 to a negative value of -₹7.34 in 2017-18. Post-AI, there was a strong turnaround, with EPS rebounding to ₹58.22 by 2023-24, highlighting AI's role in operational efficiency and profitability recovery.
ICICI maintained a more stable EPS trajectory pre-AI, peaking at ₹84.94 in 2013-14 before declining slightly. Post-AI, ICICI also improved, with EPS rising to ₹58.22 by 2023-24, demonstrating stable growth driven by AI integration.
SBI's Net Profit Margin deteriorated pre-AI from 9.05% in 2010-11 to -2.96% in 2017-18. However, post-AI adoption, it surged to 28.61% in 2023-24, reflecting enhanced cost control and revenue generation through AI.
ICICI, known for its strong Net Profit Margin, experienced minor fluctuations pre-AI but stayed above 18%. Post-AI, it reached a high of 28.61% by 2023-24, indicating improved operational efficiency and robust financial management.
SBI showed a steady decline in ROCE return on capital employed) during the pre-AI period, from 2.26% to 1.81%. Post-AI, it decreased slightly to 1.47% by 2023-24, indicating ongoing challenges in managing capital efficiently despite AI-driven improvements.
ICICI exhibited a more consistent ROCE pre-AI, reaching 3.59% in 2016-17. Post-AI, ROCE stabilized at 3.27%, demonstrating its effective capital deployment strategies enabled by AI.
SBI's ROA (Return on assets) weakened from 0.6% in 2010-11 to -0.18% in 2017-18. However, AI adoption boosted ROA to 0.98% by 2023-24, signifying more efficient asset utilization.
ICICI maintained a higher ROA pre-AI, peaking at 1.72%. Post-AI, its ROA steadily increased to 2.18% by 2023-24, indicating a stronger focus on asset efficiency and profitability.
Pre-AI, SBI's ROE (Return on equity) dropped significantly from 11.34% in 2010-11 to -3.37% in 2017-18. Post-AI, there was a remarkable recovery to 17.46% in 2023-24, driven by AI's impact on financial management and operational processes.
ICICI showed consistent pre-AI ROE growth, peaking at 13.89%. Post-AI, it further improved to 17.37% by 2023-24, reflecting sustainable profit generation and effective equity utilization.

E. Liquidity

Liquidity of banks is plays a pivotal role in assessing the ability of banks to meet short term obligation in a financial year. This analysis focuses on four key liquidity indicators such as Current Ratio, Quick Ratio, Investment Deposit Ratio, and Credit Deposit Ratio for SBI and ICICI banks, comparing their pre- and post-AI adoption periods from 2010 to 2024.

Table-5: Liquidity Analysis

Years	Liquidity							
	SBI				ICICI			
Pre-AI	Current Ratio	Quick Ratio	Investment Deposit Ratio	Credit Deposit Ratio	Current Ratio	Quick Ratio	Investment Deposit Ratio	Credit Deposit Ratio
2010-2011	0.04	8.5	33.45	79.9	0.07	15.86	59.77	90.45
2011-2012	0.05	12.05	30.73	82.14	0.07	16.71	61.16	97.71
2012-2013	0.04	12.15	29.52	85.17	0.09	10.53	60.38	99.25
2013-2014	0.03	13.81	28.87	86.84	0.09	11.31	55.79	100.71
2014-2015	0.06	11.02	29.64	84.47	0.06	13.81	52.43	104.72
2015-2016	0.07	10.89	31.97	83.56	0.13	14.97	44.32	105.08

2016-2017	1.11	11.94	35.54	80.38	0.12	16.31	35.32	98.69
Post-AI								
2017-2018	0.08	13.83	38.45	73.79	0.12	20.44	34.68	92.92
2018-2019	0.09	18.06	36.1	73.35	0.12	18.66	33.84	90.54
2019-2020	0.08	8.57	42.65	74.74	0.09	15.76	32.11	86.52
2020-2021	0.09	7.48	43.12	70.85	0.07	14.52	31.16	80.95
2021-2022	0.08	6.71	43.21	67.86	0.06	14.26	29.62	79.75
2022-2023	0.08	6.62	40.39	69.75	0.06	13.94	29.95	83.67
2023-2024	0.08	6.42	37.77	74.04	0.05	14.15	31.78	84.98

Source : Banks Official Source and Money Control Website

The Current Ratio, a measure of short-term financial health, was consistently low for both banks pre-AI. SBI experienced a significant improvement in 2016-17, reaching 1.11, a peak attributed to internal adjustments ahead of AI adoption. However, post-AI, the ratio declined to 0.08 by 2023-24, indicating a reduced reliance on current assets, likely offset by enhanced liquidity management systems enabled by AI.

ICICI maintained a relatively stable Current Ratio pre-AI, peaking at 0.13 in 2015-16. Post-AI, it hovered around 0.05 to 0.12, indicating that AI-driven operational efficiencies may have reduced the need for maintaining a higher ratio while still meeting short-term liabilities effectively.

The Quick Ratio, a stricter liquidity measure excluding inventory, remained stronger for ICICI than for SBI throughout the entire period. Pre-AI, ICICI's Quick Ratio peaked at 16.71 in 2011-12, whereas SBI's highest pre-AI ratio was 13.81 in 2013-14.

Post-AI, both banks showed different trajectories. SBI's Quick Ratio gradually fell to 6.42 by 2023-24, reflecting a reliance on more dynamic liquidity management. Conversely, ICICI's Quick Ratio, though declining, remained consistently higher than SBI's, at 14.15 in 2023-24, indicating a stronger buffer in handling short-term obligations.

The Investment Deposit Ratio represents the proportion of deposits allocated to investments. SBI showed a gradual increase from 33.45% in 2010-11 to 35.54% in 2016-17 pre-AI, reaching a peak of 43.21% in 2021-22 post-AI. This increase demonstrates a shift towards more strategic asset allocation, likely driven by AI's ability to optimize investment decisions.

ICICI had a higher Investment Deposit Ratio pre-AI, starting at 59.77% in 2010-11, but this steadily declined to 34.68% in 2017-18 post-AI, eventually stabilizing around 31.78% by 2023-24. This reduction indicates a more conservative approach to investments post-AI, suggesting AI-driven insights are helping ICICI optimize its investment portfolios while maintaining liquidity.

The Credit Deposit Ratio, a measure of how effectively banks utilize deposits to generate credit, remained a critical metric. SBI started at 79.9% in 2010-11, peaking at 86.84% in 2013-14. Post-AI, the ratio decreased, bottoming out at 67.86% in 2021-22 before slightly recovering to 74.04% by 2023-24. This decline highlights a cautious lending strategy likely influenced by AI-driven risk management models.

In contrast, ICICI consistently maintained a higher Credit Deposit Ratio, peaking at 105.08% in 2015-16 pre-AI, reflecting an aggressive lending approach. Post-AI, the ratio moderated, declining to 84.98% by 2023-24. This shift suggests AI adoption has helped ICICI refine its lending strategies, balancing credit growth with risk control.

IX.FINANCIAL PERFORMANCE OF SBI AND ICICI BEFORE AND AFTER ADOPTION OF AI

To test the financial performance SBI and ICICI Bank the following hypothesis is formulated

H_0: The no statistical significance difference in financial performance of SBI and ICICI during the pre and post adoption of AI.

To the above hypothesis statistical tool paired t-test employed using SPSS package. The outcome of the test is summarized in the following table.

The decision rule to accept or reject the hypothesis is as follows.

- If P value (sig, value) is greater than the significance value (α=0.05) should accept the null hypothesis.
- If P value (sig, value) is less than the significance value (α=0.05) should reject the null hypothesis.

Table: 6 Paired t-test results pre and post adoption AI

SBI	t value	Df	P value (Sig.)	Accept or Reject the Hypothesis	Significant or Not
CAR	.449	6	0.669>0.05	Accept	Insignificant
Debt to Owners Fund Ratio	-2.490	6	0.47>005	Accept	Insignificant
Advances to Assets Ratio	3.517	6	0.13>005	Accept	Insignificant
Advances to Loans Funds	4.411	6	0.005<0.05	Reject	Significant
ICICI	t	Df	P value (Sig.)	Reject	Significant
CAR	0.927	6	.390>005	Accept	Insignificant
Debt to Owners Fund Ratio	-1.830	6	0.117>005	Accept	Insignificant
Advances to Assets Ratio	-5.194	6	0.002<005	Reject	Significant
Advances to Loans Funds	-5.572	6	0.001<005	Reject	Significant
SBI	t	Df	P value (Sig.)	Reject	
Gross NPA	-0.260	6	0.803>005	Accept	Insignificant
Net NPA	473	6	.653<0.05	Reject	Significant
Net NPA To Advances	0.549	6	0.603>0.05	Accept	Insignificant
Net NPA to Total Assets	-0.754	6	0.479>0.05	Accept	Insignificant
ICICI	t	Df	P value (Sig.)	Reject	
Gross NPA	-6.14662	6	.479>005	Accept	Insignificant
Net NPA	0.59	6	0.955>005	Accept	Insignificant
Net NPA To Advances	.141	6	0.893>0.05	Accept	Insignificant
Net NPA to Total Assets	-0.651	6	.539>0.05	Accept	Insignificant
SBI	t	Df	P value (Sig.)	Reject	Significant
Business Per Employee	-3.142	6	0.020<005	Reject	Significant
Net Profit/ Employee (Rs.)	-1.316	6	.236>005	Accept	Insignificant
Interest Income/ Employee Rs.)	-2.511	6	0.46>005	Accept	Insignificant
Interest Income/ Branch (Rs.)	-1.532	6	0.176>0.05	Accept	Significant
Net Profit/ Branches (Rs.)	-0.872	6	0.417>0.05	Accept	Insignificant
Business/ Branches (Rs.)	-2.271	6	0.064>0.05	Accept	Insignificant
ICICI	t	Df	P value (Sig.)		
Business Per Employee	-15.539	6	0.000<0.05	Reject	Significant
Net Profit/ Employee (Rs.)	-.998	6	.357>0.05	Accept	Insignificant
Interest Income/ Employee Rs.)	-4.982	6	0.002>0.05	Accept	Insignificant
Interest Income/ Branch (Rs.)	-2.835	6	0.030<0.05	Reject	Significant
Net Profit/ Branches (Rs.)	-1.002	6	0.355>0.05	Accept	Insignificant
Business/ Branches (Rs.)	-5.426	6	0.002<0.05	Reject	Significant
SBI	t	Df	P value (Sig.)		
Dividend Per Share	9.00822	6	0.147>0.05	Accept	Insignificant
Net Profit/Share (Rs.)	1.410	6	0.208>0.05	Accept	Insignificant
Net Profit Margin	-1.306	6	0.239>0.05	Accept	Insignificant
ROCE (%)	2.395	6	0.054>0.05	Accept	Insignificant
Return on Assets	0.799	6	0.455>0.05	Accept	Insignificant
Return on Equity / Networth (%)	0.479	6	0.649>0.05	Accept	Insignificant
ICICI	t	Df	P value (Sig.)		
Dividend Per Share	1.898	6	0.106>0.05	Accept	Insignificant
Net Profit/Share (Rs.)	1.040	6	0.339>0.05	Accept	Insignificant
Net Profit Margin	0.298	6	0.776>0.05	Accept	Insignificant

ROCE (%)	-0.285	6	0.785>0.05	Accept	Insignificant
Return on Assets	0.543	6	0.607>0.05	Accept	Insignificant
Return on Equity / Networth (%)	.400	6	0.703>0.05	Accept	Insignificant
SBI	t	Df	P value (Sig.)		
Current Ratio	.769	6	.471>0.05	Accept	Insignificant
Quick Ratio	0.922287	6	0.392>0.05	Accept	Insignificant
Investment Deposit Ratio	-4.837	6	.003<0.05	Reject	Significant
Credit Deposit Ratio	1.65428	6	0.001<0.05	Reject	Significant
ICICI	t	Df	P value (Sig.)		
CAR	0.927	6	.390>0.05	Accept	Insignificant
Debt to Owners Fund Ratio	-1.830	6	0.117>0.05	Accept	Insignificant
Advances to Assets Ratio	-5.194	6	0.002<0.05	Reject	Significant
Advances to Loans Funds	-5.572	6	0.001<0.05	Reject	Significant

Calculated Values Using SPSS

X. FINDINGS AND CONCLUSIONS

- SBI maintains a relatively stable CAR, showcasing a more conservative and cautious approach to capital management, especially post-AI. On the other hand, ICICI's CAR fluctuates more, with a major decline in 2023-2024, suggesting it took on greater risk to support lending growth in a competitive environment.
- SBI exhibits more fluctuations in debt levels, particularly in 2017-2018, while ICICI has maintained a more consistent debt strategy, suggesting a more stable approach to managing debt despite periods of aggressive lending.
- ICICI shows a consistent upward trend in its Advances to Assets Ratio, reflecting a stronger focus on lending, while SBI's ratio fluctuates, indicating a more balanced approach to managing loans as part of its overall asset base. ICICI's AI-driven lending strategy may have contributed to a more aggressive growth trajectory in its loan portfolio.
- SBI experienced a sharper rise in Gross NPA pre-AI, indicating a weaker credit portfolio compared to ICICI. However, post-AI adoption, both banks witnessed significant improvements, though ICICI maintained relatively lower NPAs.
- ICICI consistently performed better in maintaining a lower Net NPA to Advances ratio, but SBI's dramatic post-AI improvement underscores the impact of technology in mitigating credit risks.
- SBI's higher initial Net NPA indicates weaker asset recovery pre-AI. Post-AI, both banks achieved considerable reductions, with ICICI maintaining an edge due to its historically lower Net NPA.
- SBI experienced volatility in the initial post-AI years, while ICICI demonstrated more stable and sustained improvements.
- The introduction of AI has been transformative for both SBI and ICICI in reducing NPAs and strengthening their asset quality. While SBI showed remarkable post-AI improvements, ICICI's consistently lower NPAs reflect a well-managed credit portfolio. This analysis highlights the critical role of technology in reshaping risk management and improving banking sector resilience.
- The comparative analysis reveals that the adoption of AI had a significant impact on SBI's operational efficiency, resulting in higher growth rates across most metrics compared to ICICI, While ICICI showed consistent performance improvements, SBI's post-AI surge in productivity, profitability, and operational efficiency was more substantial, indicating that AI played a transformative role in driving SBI's recovery and growth. Both banks benefited from AI adoption, but the magnitude of impact was more prominent for SBI.
- AI adoption has had a profound positive impact on both banks. SBI, which faced significant financial stress pre-AI, experienced a remarkable recovery in all metrics post-AI, highlighting the transformative potential of AI in banking operations. ICICI, already stable pre-AI, further strengthened its financial performance, indicating a steady and strategic integration of AI technologies.
- Overall, the comparative analysis shows that AI has played a crucial role in enhancing the earning capacity, operational efficiency, and financial health of both SBI and ICICI, positioning them for sustained long-term growth.
- The adoption of AI has significantly influenced liquidity management strategies for both SBI and ICICI. SBI

has demonstrated a more cautious approach to liquidity and lending post-AI, indicating a conservative shift towards improving asset quality and risk mitigation. ICICI, known for its historically aggressive lending, has shown greater restraint post-AI, optimizing both its liquidity ratios and investment strategies.

- Overall, AI adoption has enabled both banks to enhance their liquidity management, balancing growth with financial stability and risk mitigation in a more competitive banking environment.
- The performance of SBI and ICICI in terms of financial term, neither SBI nor ICICI demonstrated significant improvement in capital adequacy or leverage post-AI adoption.
- The adoption of AI has had a significant operational impact on both SBI and ICICI Bank. Key areas of improvement include employee productivity, lending efficiency, and liquidity management. However, profitability metrics have not shown significant changes, indicating the need for a longer-term evaluation of AI's impact on financial performance.

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