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Original Article

Role of AI in the Banking Sector: A Study with Reference to Pre and Post Implementation of AI

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Abstract

Banking sector has undergone a significant transformation with the integration of Artificial Intelligence (AI), shifting from a manual branch-based system to a highly digitalized data-driven system. AI has enabled banks to take faster decision making, cost effectiveness, personalized services and efficient risk management thereby making AI a technologically advanced system for better performance of banks. The objective is to study the Pre and Post implementation of AI in the banking sector and also to analyze the impact of AI on financial performance and on decision-making for banks. The study has been undertaken by selecting public and private sector banks that are adopting AI services in banks, namely, SBI, PNB, ICICI, HDFC, and AXIS. Both primary and secondary sources of data have been considered for the study. For primary data, 76 bank employees were selected for the study. Data were analyzed through SPSS Statistics 26 software. The study shows that there is an improvement in the financial performance and a significant improvement in liquidity, capital adequacy ratios after the application of AI in banks. The scope of the study was limited to Guwahati and Silchar region which consists of only 5 public and private banks. The study will help the banking professional and regulatory bodies to take strategic decision-making and also to maximise higher profitability for the growth of the bank. Overall, the performance of banks has significantly shown positive responses after utilizing and adopting AI-based services, ultimately helped banks to make proper and prompt decisions.

Keywords: Artificial Intelligence (AI), Banking Operations, Decision Making, Financial Performance.

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1. Introduction:

1.1 Background of the study

The banking sector is undeniably the backbone of the economy, playing a significant role in fostering economic growth and development. By providing finances in the economy, banks enable businesses to expand their operations and create employment opportunities, thereby streamlining economic growth. Banks also mobilise savings and utilise them into productive investments, such as loans to businesses and individuals, which helps to finance economic growth and development.

1.2 Artificial Intelligence

Artificial Intelligence has a crucial impact on the financial sector, including banking services. This technology has transformed banking services into more automated and data-driven solutions. AI helps banks automate tasks in a more effective and efficient manner, also helps to solve queries, and predict issues, which helps in making faster decisions for the bank.

1.3 AI has impacted banking in the pre-AI era and post-AI era: A Bird's eye view

Pre-AI Era: In the pre-AI era, banking was largely manual and labor-intensive. Most banking tasks, such as loan approvals, credit scoring, and customer service, were performed manually by humans. As it is stated above, data analysis was limited to basic reporting and descriptive analytics, with little to no predictive capabilities. Banking systems have relied on predetermined rules and approaches, with limited flexibility and adaptability. Customer engagement was limited to standing in line in branch visit, over the phone calls, and basic online banking services. These resulted in higher error rates, manual operations at work, delays in the process and ultimately dissatisfaction of customers.

Post-AI Era: The post AI era has evolved a transformative role in the banking sector. With the Implementation of Artificial Intelligence (AI) and Machine Learning (ML), banks have transformed their operations into more automated

systems, reducing routine tasks, thus enabling employees to do more high-value, complex tasks. AI also helps banks in making proper decisions by providing valuable data solutions and insights for increasing efficiency for the bank. AI-powered chatbots, virtual assistants, and personalized solutions help banks meet the demands and expectations of customers, thus reducing errors and increasing speed and accuracy for the bank.

1.4 Artificial Intelligence in Banks:

Artificial Intelligence has become an important part of today's banking organisation. Traditionally, the banking sector heavily relied on manual processes, which led to high operational costs, errors and inefficiency. However, AI has become a total game-changer in this competitive era. By proper utilization of Artificial Intelligence in banking services, it helps to reduce repetitive tasks and processes automated tasks, which helps to reduce costs and enhance profit for the bank. AI provides personalised services to customers, enabling proper decision-making for the bank, which will ultimately help in increasing operations for the bank.

AI has become a game-changer for banking operations: Artificial Intelligence helps the employees to focus on more complicated and important task that requires human decision and judgement. By automating repetitive tasks such as loan processing, data entry and fraud detection, AI not only helps in reducing processing times and operational costs but also minimizes human error, leading to a more streamlined and reliable banking system.

AI empowers data-driven decision-making: The vast amount of customer data generated by modern banking interactions holds a large number of insights. However, analysing this data effectively can be a tedious task. Artificial Intelligence helps to identify patterns, predict customer behaviour, and assess risk profiles to minimize fraud. These insights enable banks with the knowledge to make informed decisions, ultimately driving them towards a data-driven success in future.

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1.5 AI initiatives in major Indian banks

State Bank of India: SBI has launched an AI-powered chat assistant named as SBI Intelligent Assistant (SIA) that assists with day-to-day banking tasks. Developed by Payjo, SIA can handle nearly 10,000 enquiries per second and has resolved millions of customers' queries effectively.

Punjab National Bank: PNB has implemented AI across its operations to enhance customer service, manage risk and also to improve efficiency. The PNB chatbot PIHU enables customers to solve queries and provides better service to the customers.

HDFC Bank: HDFC Bank has developed EVA, an AI-based chatbot, which has addressed over 2.7 million customer queries and interacted with more than 530,000 unique users. Eva can process information from thousands of sources and provide accurate and simple answers in less than 0.4 seconds.

ICICI Bank: ICICI Bank has developed software robotics in over 200 business processes and has created an AI-based chatbot, iPal, which has already been interacted with 3.1 million customers and answered about 6 million queries with a 90% accuracy rate.

Axis Bank: Axis Bank has launched an innovation lab called Thought Factory to accelerate the development of innovative AI technology solutions. The bank has also launched an AI & NLP-enabled app, Conversational Banking, to provide consumers with financial and non-financial transactions. Additionally, Axis Bank has completed robotic process automation (RPA) for most processes, including account maintenance and servicing, loan disbursements, and ATM support.

1.6 Statement of the problem

Traditional banking operations are heavily dependent on manual work, resulting in limitations in speed, accuracy and personalization. These inefficiencies lead to high operational costs, errors, and delays, which make it harder for banks to remain competitive. Furthermore, ineffective decision-making is a major shortcoming faced by the banking industry. The large amount of customer data produced

by the modern banking system remains largely unnoticed, making it harder for banks to make prompt decisions. This can have significant financial losses and an impact on the organisational reputation. In this context, the implementation of AI in banking operations has become a crucial need to meet the rapidly changing demands of customers. The study emphasises the impact of AI on Financial Performance and decision-making in both Public and Private Banks.

1.7 Significance of the study

This study investigates the impact of Artificial Intelligence (AI) on the banking industry, specifically comparing the pre- and post-implementation phases. Furthermore, it delves into how AI influences the financial performance of banks and enhances strategic decision-making processes. The significance of this research lies in its potential to contribute to the growing body of knowledge regarding financial technology while providing actionable insights for banking professionals, policymakers, and researchers. Additionally, this study identifies profit trends before and after the adoption of AI, enabling institutions to forecast future operating profits more accurately. Finally, by offering a comparative analysis of public and private sector banks, the research highlights the varying degrees of AI-driven performance across different organizational structures.

2. Literature Review

Husain et al. (2022) examined the impact of AI on the banking industry's performance. The study found that AI systems have the potential to transform the operations and enhance the performance of the banking industry. Lamey et al. (2024) investigated the impact of the adoption of fintech on the non-financial performance of banking institutions in developing countries, considering the mediating role of circular economy practices. The study found that fintech adoption positively and significantly impacts customer satisfaction and organisational growth.

Al-Jarrah et al. (2024) conducted a systematic literature review on Artificial Intelligence in fraud detection. The authors found that AI-powered algorithms can an-

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alyze real-time data and detect fraudulent activities. This has led to improved decisions regarding fraud detection and prevention, and to reducing financial losses. Bhatnagar and Mahant (2024) conducted a study on literature review on the role of AI in the banking industry. The authors noted that AI-powered algorithms can analyze customer data and provide personalized investment recommendations, helping customers to make proper and informed investment decisions.

Bardhan et al. (2024) discusses the significance of adopting AI in enhancing predictive analytics in financial planning. The study demonstrates how AI can revolutionise financial management by providing more accurate and productive decision-making tools. Sailaja et al. (2024) found that AI can improve risk mitigation by early detection of suspicious activities in financial transactions. The study emphasised the importance of AI in improving operational efficiency, particularly in the areas of fraud detection and risk management.

Gupta et al. (2024) conducted a study on the financial performance of pre- and post-use of an AI application in relation to HDFC Bank. The study pointed out that after the implementation of AI in banks, the progress of banks in relation to financial ratios has gradually increased, which increases the effectiveness and efficiency of the bank. Jomon Jose M. & P. S. Aithal (2023) studied the Application of AI provided by public sector banks in Kerala, as well as the modern banking practices. The study found that AI have a significant impact on various banking practices.

2.1 Research gap

While existing literature demonstrates that Artificial Intelligence (AI) has a significant impact on the Indian banking sector, critical gaps remain regarding the comparative analysis of pre- and post-implementation phases. Further research is essential to develop effective strategies that promote awareness, reduce these implementation gaps, and encourage broader adoption of AI across the industry. Addressing these research gaps allows for a deeper understanding of the ethical implications, and operational challenges within both public and private sector banks, ensuring successful integration. Consequently, this study examines the impact of Artificial Intelligence on financial performance and strategic deci-

sion-making. The proposed work provides valuable guidance for banking executives, emphasizing how AI technologies can enhance customer satisfaction, foster revenue growth, and improve profitability. Ultimately, this research assists banks in making more accurate and quick data-driven decisions for the future.

2.2 Objectives of the study:

1. The objective is to study the Pre and post-implementation of AI in the banking sector.
2. To analyze the impact of AI on financial performance and on decision-mak ing for banks.

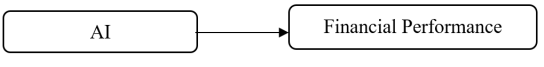
3. Methodology of the study:

3.1 Structural Equation Model:

The Theoretical framework of the structural equation model has been shown in Fig. 1.

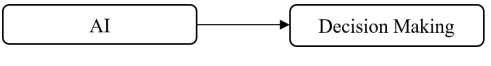
Bi-Variate Analysis Model:

Model 1: Financial Performance as dependent variables



$$FP = \beta 0 + \beta 1\ AI + e$$

Model 2: Decision Making as Dependent Model



$$DM = \beta 0 + \beta 2 AI + e$$

Fig. 1: Theoretical Framework

This research work is primarily focused on establishing the bidirectional relationship between AI and Financial Performance and AI with Decision Making. This study will help in analyzing the impact of AI on financial performance in banks

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and also to know how AI will lead to better decision-making for banks.

To achieve the 1st objectives, the following ratios, along with the formula adopted for the study.

Capital Adequacy Ratios	**Formula**	**Description**
Capital Adequacy Ratio (CAR)	(Tier 1 Capital + Tier 2 Capital) / Risk-Weighted Assets × 100%	It assesses a bank's ability to tolerate losses resulting from risky assets.
Profitability Ratios	**Formula**	**Description**
Return on Equity (ROE)	Net Income ×100 Shareholder's Wealth	It measures net income of the bank in relation to shareholder's wealth.
Return on Assets (ROA)	Net Income ×100 Total Assets	It shows bank's net income to total assets.
Net Interest Margin	(Interest Income - Interest Expense) ×100 Interest Earning Assets	It demonstrates the bank's capacity to keep deposit interest low while keeping advance interest high.
Earnings per Share (EPS)	Net Income / Number of Shares	It shows the earning of the shareholder of the number of shares held to the total profit of the business.

Table 1: Table showing the various ratios along with the formula (Source: *Author's own calculation*)

To achieve the 2nd objectives, the following variables, along with parameters, were adopted for the study.

Category	**Parameter/Variable**
AI in Banking	Accuracy
	Convenience
	Reliability
	Efficiency
	Compliance
Financial performance	Profitability
	Liquidity
	Operational cost

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	Growth rate
	Capital adequacy
Decision Making	Decision Accuracy
	Decision Speed
	Consistency
	Risk Reduction
	Long term financial goals

Table 2: Variables and parameters adopted for the study (Source: *Author's own calculation*)

3.2 Hypothesis of the study:

H1: AI-based services have a significant influence on financial performance in banks.

H2: AI-based services have a significant influence on decision-making in banks.

3.3 Research Design:

The research is exploratory in nature. It focuses on the pre and post-implementation of AI in banks and also analyses the impact of AI on financial performance and decision-making in banks.

i. Sampling Design: Based on the total number of employees, the respondents were chosen who deal with AI services in both Public and private banks. A multi-stage sampling method was adopted to determine the sample size for the study. A 5-point Likert scale was used to design the question, varying from "Strongly Disagree" to "Strongly Agree" to measure the opinions and perceptions of employees. Questions which were part of the survey include "To what extent AI services help in banking services?" and "To what extent AI has improved profitability in your bank?"

ii. Participants: Bank employees from both Public and Private banks were taken as respondents for the study. Banks that were adopted for the study were based on the year of AI implementation in the bank, and the branches that had higher profitability as well as customer footfall, were taken into consideration

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for the study.

Stages of the Sampling Process:

1st stage of Sampling: Banks were selected based on the implementation of AI services.

2nd stage of Sampling: Branches were selected having higher profitability and higher customer footfall, each one from Guwahati and Silchar regions.

Bank name	Bank type	Year of Implementation of AI	Branch Name	Total number of employees dealing with AI (Total population)
State Bank of India	Public Bank	2017	South Guwahati Br New Silchar Br	14 7
Punjab National Bank	Public Bank	2018	G.S.Road Branch Silchar Branch	12 6
ICICI Bank	Private Bank	2017	Fancy Bazaar N.S. Avenue Br	8 6
HDFC Bank	Private Bank	2017	Ulubari Branch Silchar Br	13 6
AXIS Bank	Private Bank	2017	Lalganesh Br. Club Road Br	12 9
Total				93

Table 3: Selection of Bank along with the branch adopted for the study.
(Source: *Primary Bank Survey*)

Sample size determination: Taro Yamane's sample size calculator was used to determine the sample size, where the total number of bank employees of 5 (Five) banks was considered for the study. The sample size was determined to be 76. Taro Yamane's formula (1967) was adopted to calculate the sample size for a

finite population.

$n = N/(1+N\times e^2)$

where n: Sample size

N: Population size

e: Margin of error (as a decimal)

Sampling Methodology

Stratified random sampling is a probability sampling method where the total population is divided into distinct subgroups, known as 'strata,' based on specific parameters. In this study, the population was stratified according to the number of employees within each of the five selected banks and their respective branches across the Guwahati and Silchar regions. Following data collection, the stratified random sampling method was employed to determine a proportionate sample size from each stratum. Subsequently, a simple random sampling approach was used to select employees from each bank who were willing and enthusiastic to participate in the survey. This technique ensures that each participating bank is represented in proportion to its total population. Consequently, this approach facilitates a more accurate and representative analysis of employee perceptions regarding the implementation and use of AI services within the banking sector.

The formula for Stratified Random Sampling is:

Proportionate Stratified Random Sample = (Sample size/population size) × Stratum Size Source: Investopedia

3rd Stage of sampling was the selection of Employees: Employees were selected using a stratified random sampling method who deal with AI services in the respective bank.

Bank Name	Total population	Sample size population	Responded employees
SBI	21	17	17

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PNB	18	15	15
ICICI Bank	14	11	11
HDFC Bank	19	16	16
AXIS Bank	21	17	17
Total	93	76	76

Table 4: Selection of employees using Stratified random sampling from public and private banks (Source: Primary data though bank visit and authors own calculation).

From table 4, a total of 76 bank employees were taken for collection of data, out of which 76 respondents have participated in the survey giving a response rate of 100%.

3.4 Data collection methods

The research relies on both Primary and secondary data.

i. **Primary Data:** Primary data were obtained through structured interview schedules administered to employees in both public and private sector banks who actively utilize AI services. The data collection focused on participants located in the Guwahati and Silchar regions.

ii. **Secondary Data:** Secondary data were gathered from official annual reports, including raw data from profit and loss accounts and balance sheets. Additionally, information was sourced from reputable journals and academic papers relevant to the subject matter to provide a comprehensive context for the study.

iii. **Analysis Techniques:** Following data collection, the information will be processed using SPSS Statistics 26. The study employs a range of statistical tools, including Descriptive Analysis, Correlation Analysis, and Multiple Regression Analysis, to test the research hypotheses. Furthermore, a Reliability Analysis using Cronbach's Alpha was conducted for each variable to ensure the internal consistency and validity

of the measurement scales used in the survey schedules.

4. Results and discussion:

To study the pre and post-implementation of AI in 5 leading banks, the ratios of profitability and capital adequacy ratio were taken into consideration. Various banks have implemented AI after 2017, so pre-AI will be from 2014-15 to 2016-17, and post-AI will be from 2017-18 to 2024-25. Also, the data was taken for that period as data was not available in a complete form for 3 banks out of 5 banks.

4.1 Profitability ratios for the last 10 years:

The following tables provide the Profitability ratios for the last 10 years.

Year	Bank Name							
	SBI				PNB			
	ROE	ROA	NIM	EPS	ROE	ROA	NIM	EPS
2014-15	11.17	0.68	4.12	17.55	8.12	0.53	3.15	16.91
2015-16	7.74	0.46	3.59	12.98	17.08	1.45	2.60	(20.82)
2016-17	7.25	0.41	2.87	13.43	15.99	0.19	2.38	3.92
2017-18	(3.78)	(0.19)	2.48	(7.67)	(1.57)	(1.60)	2.16	(55.39)
2018-19	0.48	0.02	2.32	0.97	0.04	(1.25)	2.41	(30.94)
2019-20	7.74	0.38	2.81	16.23	0.11	0.04	2.30	0.62
2020-21	9.94	0.48	3.04	22.87	0.15	0.15	2.88	2.08
2021-22	13.92	0.67	3.12	35.49	5.96	0.26	2.71	3.54
2022-23	19.43	0.96	3.16	56.29	3.94	0.18	3.06	5.76
2023-24	20.32	1.04	3.28	68.44	11.66	0.54	3.09	7.49
2024-25	19.87	1.10	3.09	69.77	19.33	0.97	2.93	14.77

Table 5(a): Profitability ratios of public bank. **(**Source: Bank annual reports.)

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Year	Bank Name											
	ICICI				HDFC				AXIS			
	ROE	ROA	NIM	EPS	ROE	ROA	NIM	EPS	ROE	ROA	NIM	EPS
2014-15	14.3	3.12	3.48	17.56	17.52	1.91	3.61	23.21	3.12	1.31	1.62	3.28
2015-16	11.3	3.45	3.49	15.23	17.97	2.01	3.97	24.42	3.42	1.84	1.84	3.87
2016-17	10.3	2.11	3.25	15.31	18.04	1.61	4.12	28.59	3.20	0.87	0.97	4.15
2017-18	6.6	0.05	3.23	10.56	18.22	1.93	4.2	33.88	1.21	(1.21)	0.24	3.12
2018-19	3.2	0.54	3.42	5.23	16.30	1.90	4.3	39.33	3.62	0.71	1.41	7.23
2019-20	7.1	1.23	3.73	12.08	16.76	2.01	4.3	48.01	5.12	1.12	2.54	15.21
2020-21	12.2	1.87	3.69	23.67	16.60	1.97	4.1	56.58	7.55	0.70	3.53	22.15
2021-22	14.8	1.95	3.96	32.98	16.90	2.03	4.0	66.80	12.91	1.21	3.47	42.48
2022-23	17.3	2.16	4.48	44.89	17.39	2.07	4.10	79.25	13.54	0.80	4.02	31.17
2023-24	18.7	2.37	4.53	52.33	16.10	1.98	3.53	85.83	14.04	1.83	4.07	80.67
2024-25	18	2.41	4.32	65.89	18.04	2.37	4.24	87.48	14.68	2.14	4.41	87.95

Table 5(b): Profitability ratios of private bank **(**Source: Bank annual reports.)

Interpretation:

From the above table 5(a) and 5(b), it has been found that the profitability ratios of both public and private banks have significantly increased post implementation of AI. Again, it was found that during the period of 2017-18, the profitability ratios of the banks showed a declining rate. The key determining factors are an increase in loan loss provisions, mark-to-market losses on government securities, provisions, perks and payments to employees. (Chairman's Report, State Bank of India, Annual Report, 2017-18). The banks' operating profit before provision, tax and dividends for the fiscal year 2017-18 has declined due to unfavourable macroeconomic factors, which had a particularly adverse impact on the banks' exposure to Indian Corporates (Director's Report, Punjab National Bank, Annual Report, 2017).

Apart from these, several banks such as ICICI, AXIS bank have reported in their annual reports that the key reason for the decline in declining the profitability ratios is mainly due to a significant increase in provisions of NPA and a rise in operating expenses relative to revenue growth. But after that, both public and private have somehow managed to overcome the situation and therefore again managed to attain the position which was shown in 2024-2025. Hence, it can be interpreted that post-implementation of AI can be one of the reasons for the improvement of

the profitability of the bank.

Year	CAR				
	SBI	PNB	ICICI	HDFC	AXIS
2014-15	12	9.84	17.0	9.24	11.31
2015-16	13.12	10.16	16.6	10.94	12.94
2016-17	13.11	11.98	17.4	11.31	14.22
2017-18	12.60	9.82	18.4	14.8	16.57
2018-19	12.72	10.13	16.9	17.11	15.84
2019-20	13.06	14.50	16.1	18.52	17.53
2020-21	13.74	14.32	19.1	18.79	19.12
2021-22	13.83	14.50	19.2	18.9	18.54
2022-23	14.68	15.50	18.3	19.26	17.64
2023-24	14.28	15.97	16.3	18.80	16.63
2024-25	14.25	17.01	17.25	19.55	17.07

Table 6: Capital Adequacy Ratio for Public and Private banks. **(**Source: Bank annual reports.)

Interpretation:

From Table 6, it can be seen that both the public and private banks have shown significantly positive results after the implementation of AI in maintaining the capital adequacy ratio in the bank. Also, it has been analysed that private banks show a higher Capital Adequacy ratio as compared to public banks and also the ratio of both the banks have increased significantly in recent years.

4.2 Reliability Statistics:

Cronbach's Alpha is used to determine the scales of items of each variable and to check whether the variables and the related items are valid and reliable for further analysis.

Interpretation:

Table 7 reveals that the reliability of each item, i.e. AI, Financial Performance and Decision Making, is more than 0.6. So, it can be said that all the variables are reliable and can be carried for further analysis.

Variables	No of items	Cronbach's Alpha
AI	5	0.771

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Financial Performance	5	0.833
Decision Making	5	0.707

Table 7: Reliability Scale: AI, Financial Performance, and Decision Making (Source: *Primary survey and data were analysed through SPSS software*)

4.3 Descriptive analysis:

Name of variable	Total numbers	Mean	Standard Deviations
AI	76	3.01	1.009
Financial Performance	76	3.49	0.913
Decision Making	76	3.78	0.888

Table 8: Descriptive analysis between AI, Financial Performance and Decision Making (Source: *Primary survey and data were analyzed through SPSS software*)

Interpretation:

Table 8 above reveals that the standard deviation of both dependent variables, i.e. Financial Performance and Decision Making, is consistent with their respective means, making it more favorable than the independent variable AI. It shows how accurately the sample mean determines the population mean.

4.4 Correlation Analysis:

The association or correlation between two or more variables can be established through Correlation analysis. The correlation spans from +1 to -1. The variables are said to be positively correlated if the correlation value is close to +1, and the variables are said to be negatively associated if the value is closer to -1. From the table, it is found that the independent variables AI (Artificial Intelligence) have a strong correlation with Financial Performance (FP), i.e. (r=0.777) and also with Decision Making (DM), i.e. (r=0.820) at the 0.01 level of significance.

Hence, hypotheses 1 and 2 were supported. These highlight that an increase in the level of awareness and implementation of AI services in banks will enhance financial performance for the bank, which will ultimately help in making better decisions for the bank.

	AI	Financial Performance (PF)	Decision Making (DM)
AI	1		
Financial Performance (FP)	0.777**	1	
Decision Making (DM)	0.820**	0.794**	1

**. Correlation is significant at the 0.01 level (2-tailed).

Table 9: Correlation between AI, Financial Performance and Decision Making (Source: *Primary survey and data were analyzed through SPSS software*)

4.5 Regression Analysis:

Regression analysis is an important tool to determine the effect of independent/ predictor variables on dependent variables. F-statistics shows that the model is significant when P value is less than 0.01. This indicates that if the model is accurate and precise, the findings achieved from using the model are also dependable and generalizable. R square and adjusted R square measure the predictive power of the independent variables, or how much the independent variable explains the dependent variable. The dependent Variables Financial Performance (FP) and Decision Making (DM) were regressed on predicting variables, Artificial Intelligence (AI).

Hypothesis	Regression Weights	R^2	β	T	F value	P- value	Results
H1	AI- FP	0.604	0.703	10.620	112.787 F (1,74)	0.000 P<0.001	Supported
H2	AI- DM	0.673	0.721	12.333	152.095 F (1,74)	0.000 P<0.001	Supported

Table 10: Regression between AI, Financial Performance and Decision Making

(Source: *Primary survey and data were analyzed through SPSS software*)

Predictors: AI = Artificial Intelligence

Dependent Variables: FP = Financial Performance, and;

DM = Decision Making.

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Interpretations:

From the above table 10, it has been analysed that the independent variables AI have significantly predicted Financial Performance (FP), F (1,74) =112.787 and Decision Making (DM), F (1,74) =152.095, $p < 0.001$, which indicates that AI has a significant and strong impact on Financial Performance and Decision Making, respectively. Moreover, the ($R^2 = 0.604$) and ($R^2 = 0.673$) depict that the model explains 60.4 % and 67.3%, respectively for the dependent variable Financial Performance and Decision Making.

The hypothesis was studied to know about the relationship between artificial intelligence in banking (AI), Financial Performance (FP) and Decision Making (DM). The result for the relationship between Artificial Intelligence and Financial Performance is positive and moderately significant with (B=0.703, t =10.620, $p< 0.001$) and with Decision Making (B=0.721, t =12.333, $p< 0.001$). Hence, the hypotheses were supported.

4.6 Multi-collinearity Test:

Multicollinearity represents a high degree of linear intercorrelation between explanatory variables in a multiple regression model and leads to incorrect results in regression analyses. The tools for diagnosis of multicollinearity include the Variance Inflation Factor (VIF), condition index and tolerance. Tolerance is the amount of variability in one independent variable that is not explained by other independent variables. Multicollinearity is considered to be present when VIF is higher than 5 to 10 or the condition indices are higher than 10 to 30. Also, if the tolerance level should be more than 0.10.

Independent Variables	Tolerance	VIF	Condition Index
Accuracy	0.454	2.203	7.356
Convenience	0.312	3.204	9.817
Reliability	0.397	2.519	10.696
Efficiency	0.410	2.439	12.683

Compliance	0.373	2.678	15.074

Dependent Variables: Financial performance and decision making

Table 11: Collinearity Statistics of AI parameters with Financial Performance and Decision-Making (Source: Primary Source).

Interpretation:

From Table 11, it was found that Multicollinearity was examined using VIF, Tolerance and Condition Index using SPSS Statistics 26 software. The VIF ranges between 2.203 and 3.204, which are below the threshold limit of 5. Also, the tolerance values exceed 0.10, and the maximum Condition Index is 15.074, which is below the maximum value of 30.

Hence, these results suggest that there is no such multicollinearity among the independent variables.

5. Discussion and Findings:

The profitability ratios as well as capital adequacy ratios were positively increased after the implementation of AI. Again, the ratios of private banks have shown better results than those of public banks. Therefore, it can be summarized that AI has a positive impact on bank financial performance. This finding is parallel to the study made by Gupta et al. (2024) where almost all the ratios are either stable or improving after implementation of AI. Also, efficiency and effectiveness of operations have gradually increased after AI adoption in bank. Gupta et al. (2024)

The statistical analysis demonstrates that the variables employed in this study are highly reliable and closely aligned with their respective mean values, suggesting that the findings possess a strong degree of generalizability for future research. A robust correlation exceeding 0.7 was observed across all parameters, indicating that Artificial Intelligence (AI) maintains a significant positive relationship with both the financial performance and the strategic decision-making processes of banks. This aligns with the work of Jomon Jose and Aithal (2023), who identified a moderate positive correlation between AI applications and overall banking

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practices. Furthermore, the regression models reveal that AI accounts for 60.4% of the variance in financial performance and 67.3% in decision-making efficacy. These results are consistent with Jomon Jose and Aithal's (2023) findings, which reported a standardized regression of 64.1% for AI's impact on banking systems.

Beyond the quantitative metrics, the comparative analysis indicates that private sector banks currently maintain a technological lead in AI implementation over their public sector counterparts. The findings suggest that AI adoption serves as a critical driver for organizational success by refining financial outcomes and enabling more precise, data-driven decisions. This conclusion finds strong support in the literature; Husain et al. (2022) emphasized AI's transformative potential regarding institutional performance, while Bhatnagar and Mahant (2024) underscored the technology's capacity to leverage customer data for personalized decision-making, ultimately benefiting both the consumer and the broader banking industry.

6. Conclusion:

Artificial intelligence has a long-term impact on the Indian banking sector. AI helps the banks to minimise the workload and to provide seamless banking services to customers, which helps banks to increase their financial performance, ultimately making proper and efficient decisions for future growth and development. By the proper implementation of Artificial Intelligence in banks, banks can leverage their operations, which will help them to sustain in this competitive era.

The study also supports the bidirectional relationship between AI and Financial Performance and with Decision making, which forms a part of the Structural Equation model as adopted by AI. Therefore, the model strengthens the theoretical framework in the context of AI in financial performance and decision-making for banks. Tailoring to the needs of the customers and providing better quality of banking services with the inclusion and adoption of Artificial Intelligence will be a game-changer for the organisations in the near future.

7. Scope for future research:

While the study explains the role of Artificial Intelligence in relation to pre-and post-implementation in the banking sector, and also its impact on financial performance and decision-making in banks in Guwahati and Silchar Region, further study can be made in relation to other parts of the country.

Also, as data was not available for some banks for which only 10 years of data was taken for making a comparison between public and private banks, further research can be made in future to know more details about the trend of financial performance and the impact of AI in the banking sector.

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