Financial Optimization in the Automotive Industry: Leveraging Cloud-Driven Big Data and AI for Cost Reduction and Revenue Growth

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ABSTRACT

This research delves into the use and reference of artificial intelligence (AI) technology by Indian banks and how they affect their operational process. It also looks at how financial performance is affected by the disclosure of AI-related terminology. The distribution of AI and associated information in the textual data of the annual report is examined using content analysis. Using content and regression analysis, the research shows that disclosure of AI-related phrases has been steadily increasing in the annual reports of Indian banks. It seems that several Indian banks continue to be in the early phases of adopting and deploying AI technology, since their degree of transparency about AI is still inadequate. The findings suggest that the publication of AI-related terms impacts the financial performance of institutions. This conclusion is in line with previous research showing that AI increases revenue and decreases costs, and it also supports the popular view that AI enhances accounting efficiency in the areas of ROA and ROE while having a negative impact on overall expenditures. The research of AI voluntary disclosure is an expanding field, and this work adds to it in several ways. To begin with, it makes it possible to objectively evaluate AI's utility by creating an artificial intelligence disclosure index which tracks the current state of AI implementation. Secondly, it sheds light on how financial success relates to AI disclosure. Third, it emphasises the requirement for disclosure guideline rules and supports the work of legislators, international agencies, and supervisory organisations to solve AI disclosure challenges. Lastly, it contributes to the automotive banking industry's practitioners who are implementing AI-driven operational transformations and lends credence to the need for more AI transparency and well-informed decision-making that is in line with financial institutions' goals.

INTRODUCTION

In recent decades, the exploration in AI has led to the creation of intelligent robots capable of doing activities that need human intellect. Artificial Intelligence employs computer programs and algorithms to acquire knowledge, deduce conclusions, and make judgements using data inputs. Artificial intelligence technologies replicate human cognitive functions, enabling data analysis, work automation, and support across several fields. AI is the scientific discipline and technology focused on creating intelligent computers that can replicate human behaviour and cognitive functions.

AI has the potential to enhance financial reporting, but it also carries the risk of bias, lack of openness, privacy issues, and compliance issues. Problems with interoperability, high implementation costs, training shortages, potential job losses, and ethical considerations are among issues that organisations may encounter. Organisations may lessen the impact of these drawbacks by focussing on responsible AI practices, improving data governance and quality, and eliminating biases in AI models. It is equally important to keep up with the latest rules and ethical issues.

These results imply the AI applications are advantageous for the automotive banking industry, for stakeholders and shareholders alike, and for greater financial sector efficiency, which boosts the economy. To determine the degree to which AI impacts companies, customers, and the economy as a whole, it is necessary to measure the relationship between bank performance and AI usage.

There has been an uptick in the disclosure of AI-related terms in the financial statements of Indian-listed banks, according to an evaluation of the content of 116 reports from 15 of these institutions. The findings also show that banks' financial performance is affected by the exposure of AI-related terms. Disclosure of AI-related terms had a favourable effect on return on assets and return on equity (ROA and ROE) but a negative effect on overall expenditures for the bank. This goes against the grain of the prevalent belief that AI increases revenue and decreases costs, as seen in previous research.

This research adds to the expanding corpus of literature on artificial intelligence. By creating an initial AI-related word disclosure index, it first ascertains the extent of AI-related word disclosure in Indian banks. Secondly, it sheds light on the connection between financial success and AI disclosure. The results of this research emphasise the necessity for disclosure guideline standards and support the work of regulatory organisations, international agencies, and policymakers to solve AI disclosure challenges. Additionally, the research highlights the need for greater AI transparency and informed decision making in a way that is consistent with financial institutions' goals and offers assistance to financial services practitioners who are using AI mechanisms to improve their operations.

Here is how the rest of the paper is structured. The research approach is shown in Section 2. The results and discussion of the research are presented in Section 3. This research comes to a close in Section 4.

Methodology:

2.1 AI Disclosure:

Researchers create an initial list of AI keywords and measure the degree of AI disclosure using the content analysis approach. Specifically, there are three steps involved in choosing topics connected to AI disclosure. The first thing researcher do is make an AI transparency score by looking at all the AI parts that have recently been mostly talked about in the automotive banking industry by professional groups. The preliminary AI transparency index was made by putting together a list of the most common AI-related words used in the financial industry.

The second step is to use the computerised content analysis program "Maxqda" to determine how often phrases pertaining to artificial intelligence appear in each bank's annual report. To help understand the AI business plan, we look at the keywords and their context, which includes the phrase or sentences immediately before and after a search term.

Thirdly, there are three groups of disclosure keywords pertaining to AI. In the first set, we have the terms that include digital consciousness, digital change, and digital competence. Applications, goods, services, and processes pertaining to artificial intelligence make up the second category. Concerning information and cyber security, the final set of issues is associated with AI. After that, multiple regressions are used using the content analysis data.

Among the many reasons for carrying out this research is the need to allay stakeholder fears about the lack of openness and responsibility in AI systems. A company's worth and shareholder composition may be impacted by the level of transparency it exhibits, which in turn attracts investors that prioritise technologically informed decision making. Transparent AI disclosure has several benefits, including luring investors and helping companies conform to changing legal regimes. Companies who are transparent about their AI practices may show that they follow regulations that aim to ensure the moral and responsible incorporation of AI. This helps with both compliance and building a strong reputation for the company.

2.2 Regression Model:

To determine the effect of include AI-related terms in yearly reports on financial performance, the regression model below is used.

$$\text{Outcome t} = N_0 + N_1 AIFREC_{T-1} + N_2 BSIZE_{T-1} + N_3 DEBT_{T-1} \\ + N_4 BDSIZ_{T-1} + N_5 INDPB_{T-1} + N_6 FORSH_{T-1} \\ + N_7 LASHR_{T-1} + N_8 BRNCH_{T-1} + N_9 BKAGE_{T-1} \\ + N_{10} YEAR_{T-1} + e \qquad (1)$$

where outcome is a list of different estimates of the automotive bank's financial health.

As part of foundational research, researcher take into consideration accounting performance metrics including net interest income (NII), the return on assets (ROA), along with return on equity (ROE). The price-earnings ratio (P/E) and other market performance metrics are also taken into account. Both ROA and ROE are frequently used in academic works because they indicate the degree to which a company's management generates profits from its property and shareholders' money. Consequently, a greater ROA and ROE indicate a better business performance. Total expenses (TEXP) are another option to explore; this is based on the assumption that using AI would lead to cost reductions and improved financial performance. It is believed that changes in the revenue and costs of the primary banking operations' lending and borrowing services have a direct impact on NII.

AIFREC, or "AI frequency," is the disclosure frequency of AI-related words as determined by the quantity of AI-related phrases that are cited in each yearly report. Each bank's AI disclosure decisions and procedures are influenced by a variety of internal and external variables. Bank managers are incentivised to adopt AI and have AI disclosure standards in accordance with the unique peculiarities of the institutions. Three sets of control variables are included in the empirical models in order to represent the governance, ownership, and cost of capital characteristics of banks as well as economic-specific traits. Many of these factors are widely recognised from prior research to have a significant impact on the performance metrics of automotive banks.

The characteristics of the bank's internal corporate governance are reflected in the first set of control variables. We account for the size and independence of the board. Because of the higher reputational costs, independent directors are seen as better monitors. Internal corporate governance variables that are fundamentally important include the board of directors. Therefore, the number of directors on the board is known as board size (BODSIZE), and the percentage of independent directors is known as independent board (INDD). We account for the possibility that a bank's performance and disclosure of artificial intelligence are the result of the board that they serve on by including this control.

The second set of controls accounts for potential performance-affecting factors such as the ownership structure of the bank and the costs of capital. In theory, the tension between a public company's shareholders and its debt holders gives rise to agency costs of capital. If debtholders think management will prioritise shareholders over them, they might impose capital use restrictions. Consequently, researcher have completed say over the bank's ownership arrangement, including the LSHAR, which is the proportion of total big shareholders holding more than 6 percent of the bank's shares. One way to keep investors' interests in check is using the foreign ownership ratio (FORSH). Additionally, the structure of the debtholders is accounted. The ratio of overall debt to long-term debt is called the debt ratio (DEBT). It is anticipated that there would be ties between AI performance and transparency and large shareholders.

Third, in line with what is currently reported in the literature on bank performance, the economic factors at the bank level are accounted. First, it has been shown that management actions and, most importantly, bank performance are influenced by the

size and complexity of a bank's operations. As a result, the basic logarithm the total assets (BSIZE) are used to limit bank size. Furthermore, bank age and branch count is accounted. The ability to interact with customers in person makes physical bank locations crucial, even in the face of the increasing popularity of internet banking services. It is proof that branch networks continue to provide banks a competitive edge by fostering long-lasting, individualised relationships with their customers, which boosts earnings and lowers loan losses. As a result, the control of bank age (BKAGE) is added, which is the overall number of years a company has been in business, and the total number of branches is controlled using BRNCH, a continuous variable that represents the numbers of branches of each bank annually. Table 1 displays the definitions of all variables.

Table 1 describes the Names and descriptions of the variables.

Variable	Definitions
AIFREC	Frequency of AI-related words used in each report
ROE	Asset return
ROA	Equity return
P/E	Net interest income
NII	Price-to-earnings ratio
TEXP	The total costs' natural logarithm
BKSIZ	Equities' natural logarithm
DEBT	Duration of debt relative to total debt
FORSH	Foreign share ratio as a percentage of total share
LARSHR	Fraction of stockholders with holdings exceeding 6%
BDSIZ	Directors serving on the board
INDPB	Board's share of non-executive directors
BRNCH	Annual branch count for all banks

As a last step, the consideration how the COVID-19 crisis affected the performance of automotive banks are taken. To do this, a fake variable is used as independent variable, setting it to 1 during the COVID-19 period and 0 otherwise. Lastly, the impacts of years are also controlled for.

2.3 Sample and Information:
Shareholders in the financial market rely on the annual report as a primary source of information when making decisions, and financial professionals use financial as well as non-financial information to construct a credible image of businesses' performance. Hence, 131 annual reports from all sixteen Indian-listed banks formed the basis of this study. All Indian banks have a PDF version of their annual reports on their websites. Words that were discussed within the context analysis are the ones that are looked for. An analysis of the evolution of mentions pertaining to artificial intelligence is offered by the newly compiled keyword dataset, which is based on the yearly reports.

3. Results and Discussion:
**3.1. Statistics for Description:**
Panel A of graph 1 summarises the disclosure of AI-related terminology for all banks. Although the range is considerable amongst institutions, the overall disclosure of AI-related terms is 2659. SBI Bank, HDFC Bank, and Canara Bank account for the largest values of AI-related terms disclosed in the dataset. These financial institutions use AI-related terminology rather often, in contrast to Karur Vysya Bank, IDBI Bank, and IOB Bank, which use AI-related terminology less often. Sample sizes for the other banks are between five and ten percent of the total.
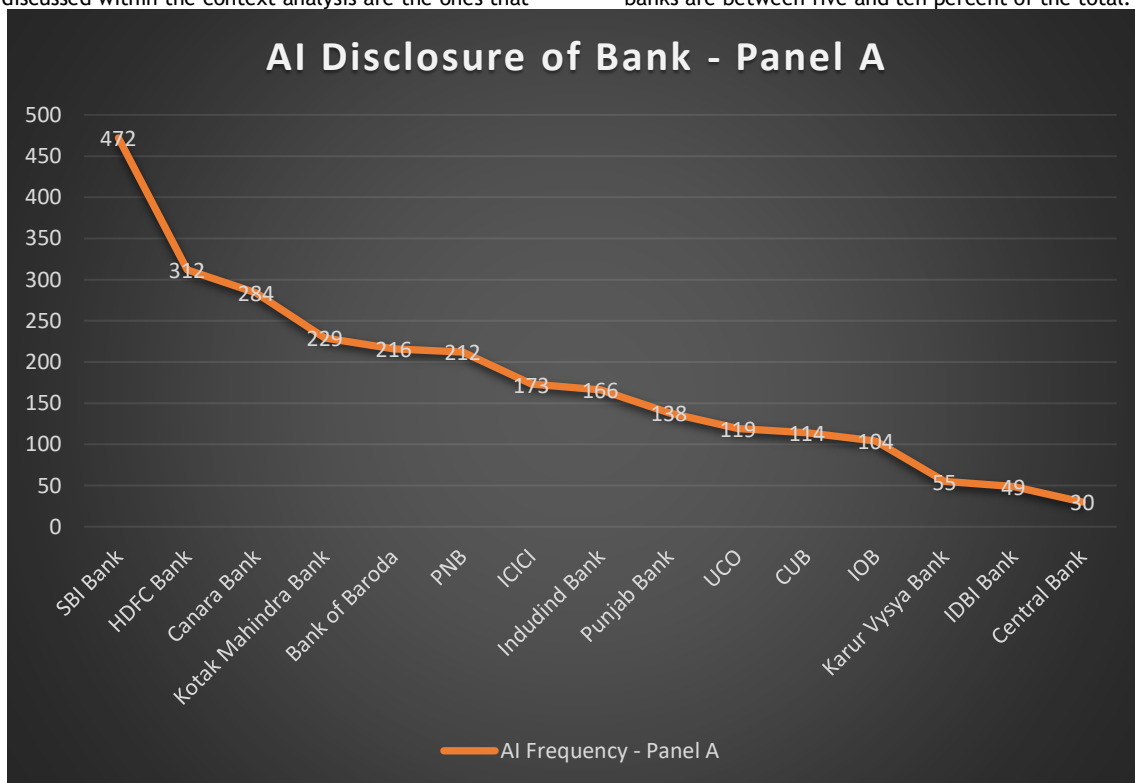
Graph 1, illustrates the summary statistics of AI disclosure by bank.

The average number of AI-related terms cited within an annual report is shown in graph 2, panel B, year by year. Keyword disclosures pertaining to artificial intelligence (AI) fluctuated among years and surged significantly between 2015 and 2023. Having said that, the previous three years saw the disclosure of about 61% of AI-related terms. This embodies the most current AI-driven paradigm shift that affects the automotive banking sector, particularly around COVID-19. There seems to be a correlation between the rise in AI-related disclosures in annual reports and the increased investment and reliance on AI deployment by banks.
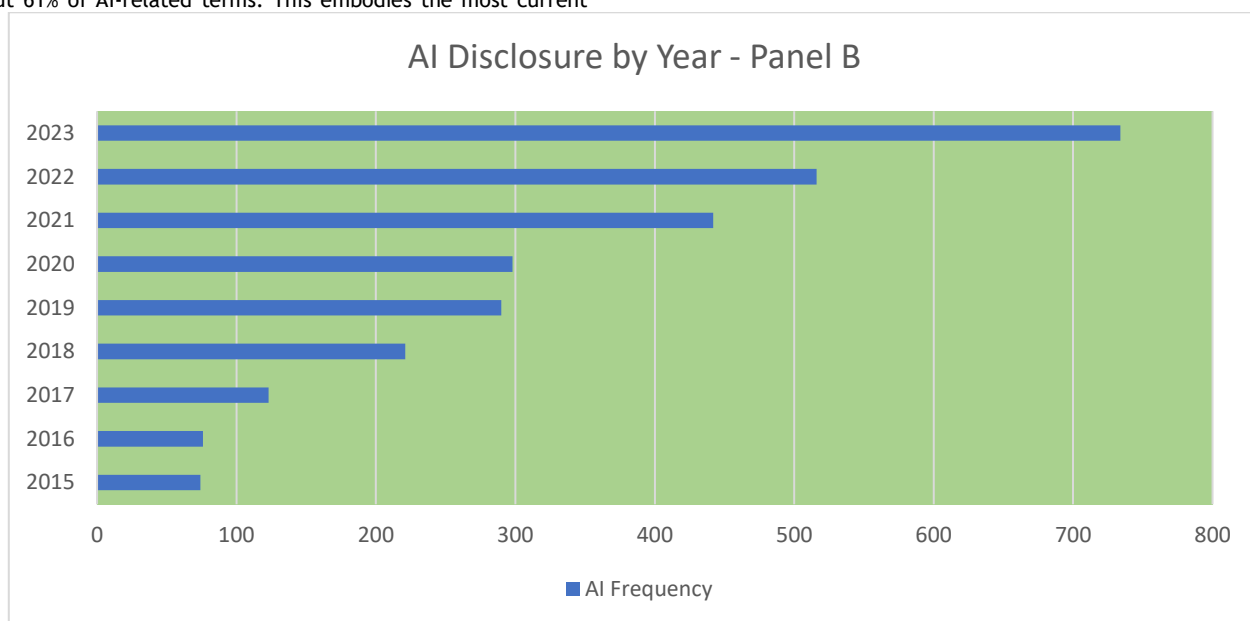
Graph 2, depicts the overall statistics of AI by year.

Three categories are used to group the disclosure keywords pertaining to AI. The terms for technological knowledge, modification, and capabilities are combined in the first category. The second category pertains to AI-related services, goods, applications, and procedures. The last category pertains to data and cyber security risks and issues associated with AI. The AI-related disclosure phrases are categorised into three groups in Table 2.

Table 2 shows the AI-related disclosure phrases.

Word Relating to AI	Frequency	Percentage
Digital awareness, digital transformation & capabilities	641	25.10%
AI-powered software, hardware, and procedure	887	34.34%
Cyber and information security	1133	43.59%
Total Word Relating to AI	1925	100%

A quarter of all results fall into the first category, which combines terms like "digital awareness," "digital transformation," and "capabilities." This shows how eager and dedicated the banks are to using AI to its fullest potential in their business. Digital transformation, financial technology, and fintech are the most used terms. Financial institutions have shown a great deal of interest in and attention towards AI by mentioning it fourteen times in their annual reports. This may be an indication that bank management is cognisant of the significance of these phrases in drawing attention to the banks' innovative nature and gaining an edge over competitors.

The second category, which includes things like AI-related apps, goods, and services, accounts for 34% of the overall. In terms of accomplishing digital transformation and making use of AI technology, this demonstrates the degree of commitment to critical services. This represents a steadfast will to use state-of-the-art technology and welcome a future where technological innovation and developments push forward. Within the automobile banking sector, the most significant terms are "digital services," "online banking," "digital banking," "digital automation," and "mobile banking." This is in order of significance. This represents the revolution and progress that are influencing the banking industry's trajectory going forward. Robotic automation makes processes more efficient, while digital, mobile, and online banking provide easy access to services. Innovative solutions that improve the banking experience as a whole are a part of digital services. These terms, taken as a whole, stand for the revolutionary power of technology in this field.

The last category relates to data and cyber security risks and issues associated with AI. The astounding number of respondents (46%) who highlighted collective difficulties and dangers demonstrates the level curiosity in this topic. Information safety, online security, electronic security concerns, IT security, digital banking services, & electronic security policies are the terms that are most often used in this category. This result shows how important it is to have solid security measures in place in the digital world. These themes emphasise how crucial it is to defend private information, fend off online attacks, and keep electronic financial services safe. They represent a dedication to

protecting digital systems and giving people and organisations safe experiences. This is in line with earlier findings and studies of the industry. For instance, almost all of financial services firms (57%) have used AI technology in the areas of risk management, according to a worldwide joint study carried out by the Global Economic Forum & the Indian Centre of Alternative Finance.

The summary statistics for the whole sample are shown in Table 4. With a range of 3-122, the frequency variable pertaining to AI has an average value of 21.99. This shows that certain financial institutions need more information on AI-related disclosures. There is a wide variety of automotive bank features from one bank to the next. For instance, BKSIZ may have any number between 23 & 8442 million, BRNCH can be anywhere from 13 to

212 offices, and the age of the bank can be anywhere from 6 to 89 years. Bank performance and AI disclosure are both predicted to be explained by these disparities.

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Table 3 illustrates the statistics of the entire samples.

Variable	Observation Number	Average	Median	Sta Dev	Minimum	Maximum
AIFREC	128	21.99	15.00	21.64	3	122
ROE	128	8.85	8.93	4.37	-1.43	17.51
ROA	128	0.95	1.98	1.53	-1.44	17.51
P/E	128	13.88	11.94	10.34	1	2.06
NII	128	175.49	112.88	250.18	10.12	914.24
TEXP	128	110.72	64.21	166.03	12.79	861.19
BKSIZ	128	2587	2201	1951	23	8442
DEBT	128	88.59	88.65	3.93	82.72	94.05
FORSH	128	0.08	0.06	1.10	1	0.53
LARSHR	128	0.68	0.67	1.22	0.31	0.98
BODSIZ	128	12.47	13	2.88	6	14
INDPB	128	0.42	0.43	0.12	0.19	0.65
BRNCH	128	65.79	49	50.62	13	212
BKAGE	128	41.70	40	19.82	6	89

3.2. Predicted Model:

The ordinary least squares (OLS) method of multiple regression analysis has been used. The findings of OLS regression analyses

of AI-related phrase disclosure upon a collection of performance indicator variables are shown in Table 4.

Table 4 shows the Ordinary least squares regressions on the impact of artificial intelligence disclosure on firm performance.

Variable	(1) ROA	(2) ROE	(3) P/E	(4) NII	(5) TEXP
AIFREC	2.87	2.55	1.26	1.98	2.32
LARSHR	−5.50	−5.76	0.55	−4.45	−0.17
DEBTH	−2.57	−2.33	−0.60	−2.60	−3.04
FORSH	3.04	3.23	−1.87	−0.13	3.06
BDSIZ	0.90	0.31	0.46	6.31	−0.11
INDPB	−3.82	−4.26	0.92	−0.24	0.27
BKSIZ	−0.16	−0.96	−1.59	−2.06	3.67
BRNCH	2.58	4.06	0.87	9.77	5.11
BKAGE	−3.79	−5.27	0.34	−9.45	2.46
Year Dummy	Ok	Ok	Ok	Ok	Ok
Bank Dummy	Ok	Ok	Ok	Ok	Ok
N	129	129	129	129	129
R^2	0.467	0.49	0.279	0.633	0.642
Adj. R^2	0.426	0.456	0.213	0.580	0.595

The outcome for ROA, ROE, NII, and P/E ratio are shown in Models 1, 2, 3, and 4, correspondingly. The outcome for overall expenditures is shown in Model 5. With R2 values ranging from 0.28 to 0.65 and F-values that are statistically noteworthy at the 2% level, the models may be used to predict the dependent variables.

This data suggests that the frequency of AI has an effect on the profitability and equity of the bank's shareholders. Similarly, previous research and the prevalent belief that AI lowers costs are corroborated by the negative and substantial relationship between the degree of AI-related term disclosures and total expenditures (TEXP) at a 6% level of significance.

The characteristics unique to each bank may also explain the differences in performance and provide more information about banking performance. At the 2% level of significance, FORSH, for instance, has a positive and statistically significant correlation

with bank performance as measured by ROA and ROE. This finding is in line with other research showing that foreign ownership improves the financial stability and performance of businesses in developing economies. Bank performance as measured by ROA, ROE, and NII is positively correlated with BRNCH. At the 2% level of significance, BDSIZ had a positive and statistically significant correlation with NII, but it had no discernible effects on other performance metrics.

Finally, the study delves into how the COVID-19 pandemic affected business operations. To start, we made use of a dummy variable that takes on the value 1 during the COVID-19 period and 0 otherwise. Combined data from two time periods: pre- and post-COVID-19. In general, researchers did not see any changes to the correlation among AI disclosure and financial institution performance. The negative repercussions are much reduced by modern technology, especially artificial intelligence. The COVID-

19 crisis has, as anticipated, altered the coefficients of a few variables.

The poor connection might be explained by the fact that AI disclosure could not have a complete impact on performance in nations with well-established and maintained customer interactions. Some banking processes may not need to be changed in order to comply with AI disclosure if the operation's efficiency is highly developed, reliable, and automated. It is very unlikely that the bank's performance was significantly affected by these AI disclosure advantages.

The result indicates that Indian-listed banks disclosed more AI-related terms in their annual reports, which is consistent with our results. Use cases and the advantages of AI for enhancing operations are often mentioned by banks creating AI systems. In line with other AI findings and industry surveys, this highlights the significance of incorporating AI technology into business models, which will save costs and improve performance. Businesses are well aware of how adopting AI may improve overall performance, boost income, and save costs. Overall, the findings support the trend of different theoretical viewpoints on AI voluntary disclosure, which holds that businesses are driven to emphasise positive information in order to attract investors and have a good economic effect.

CONCLUSION

This research investigated the potential use of AI-related allusions in yearly reports as a financial performance explanatory variable. We examined 116 yearly reports for 16 banks that are listed in India. An examination of annual reports reveals a rise in the number of disclosures pertaining to AI. This trend suggests that banks in India are becoming more cognisant of the adoption, consequences, and advantages of AI. At that same time, several Indian banks have a low degree of openness on AI, which suggests the firms are still in the early stages of using AI, at least in terms of disclosure. More work is required to enhance the situation of voluntarily AI disclosures since the development of AI adoption remains in its early stages.

This research found that accounting performance improved after AI-related term disclosure, and financial advantages were realised, based on references of AI in Indian banks' annual reports. As far as the researchers are aware, this is the first study in India to establish a connection between the disclosure of AI-related terminology in annual reports and financial success. This research adds to what is already known about AI voluntary disclosures; more specifically, it sheds light on the ways in which Indian banks provide AI-related material in their annual reports.

For banks & their bottom lines, this study's findings are very relevant and practical. The results of this research demonstrate that banks' bottom lines may benefit from the voluntary disclosure of their AI projects. Stakeholder trust is enhanced and investors informed by AI are attracted. It provides banks with a competitive edge by differentiating them from the competition and helps reduce AI-related risks. Regulatory compliance, cost savings, and technical innovation may all result from being open and honest about AI activities. These results may help financial institutions improve their AI-related procedures for better financial results.

Targeted performance improvements, improved decision making, cost savings, efficiency, customisation, risk assessment, insights into change management, competitive edge, strategic alignment, as well as new performance metrics can be revealed by analysing the effects of AI implementation in an organisational unit or process level. This method optimises the possible advantages of AI while providing a comprehensive view of its revolutionary implications on a company.

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