Oikos: Jurnal Kajian Pendidikan Ekonomi dan Ilmu Ekonomi
ISSN Online: 2549-2284
Volume 9 Nomor 2, Tahun 2025

AI DISCLOSURE IMPROVES BANKING MARKET PERFORMANCE IN INDONESIA AND THE ROLE OF BANK AGE AS A VARIABLE AFFECTING PROFITABILITY AND PROFIT GROWTH

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ABSTRACT

This study aims to analyze the effect of disclosure of the use of Artificial Intelligence (AI) technology in annual reports on the financial performance of banks listed on the Indonesia Stock Exchange in the period 2020-2024. Using a quantitative approach and panel data regression method, this study evaluates the relationship between the frequency of disclosure of AI-related terms (AIFREC) and financial performance indicators such as Return on Equity (ROE), Net Interest Income (NII), Price to Earning (P/E) and Total Expenses (TEXP). The results show that the frequency of AI disclosure has a significant impact on market perception (P/E ratio), and negatively affects ROE but positively affects market value. In addition, internal bank characteristics such as asset size, proportion of independent board, and bank age also influence the level of AI disclosure. This study emphasizes the importance of transparency and communication strategies in the adoption of AI technology as part of the digital transformation of the banking sector, and encourages the need for more uniform AI reporting standards to increase investor confidence and operational efficiency.

Keywords: Artificial Intelligence[1], Financial Performance[2], Banking[3], ROE[4], PE[5]

INTRODUCTION

In recent years, artificial intelligence (AI) has become a revolutionary technology that is transforming various industries, including the banking sector. AI has the ability to improve operational efficiency, reduce human error, and provide more personalized services for customers. The implementation of AI in banking enables automation of various processes, such as risk analysis, fraud detection, and management of customer assets and wealth *(Alzaidi, 2018)*. In general, AI refers to scientific and technological disciplines that aim to develop intelligent machines capable of mimicking human behavior and intelligence *(Ottosson & Westling, 2020).* Artificial Intelligence (AI) has become an integral part of various industries, including the banking sector. This digital transformation brings significant changes in the way banks operate, manage information, and interact with customers. With its ability to process large amounts of data and generate valuable insights, AI offers opportunities to improve operational efficiency, reduce costs, and enhance customer experience and satisfaction.

The banking sector uses AI more than other sectors because sectors other than banking tend to be less attractive in the application of AI due to several key factors. One of them is data complexity and limitations. Unlike the banking sector which has structured data such as financial transactions and credit history, other sectors such as agriculture and construction often have data that is less structured or difficult to process by AI, so the benefits are not as great as in banking. In addition, the banking sector uses AI more than other sectors because AI can improve operational efficiency, such as automation of account opening and faster customer service *(Corneles, 2024).*

In addition, AI helps analyze customer data to provide more personalized and tailored services *(Singh, 2024).* Security is also a major factor, where AI can detect suspicious transactions in real-time to prevent fraud and money laundering *(Septiani, 2024).* Regulation and compliance in the banking sector are also driving the adoption of AI to ensure transparency and data protection in line with Financial Services Authority policies *(Laras et al., 2024).* Many banks have adopted AI-based innovations, such as VIRA by BCA, face recognition, and Robo-Advisors for investment *(Bibit, 2021).* Although the cost of implementing AI is high (around $20,000 - $50,000), these investments provide long-term benefits with better efficiency and reduced operational costs *(Singh, 2024).* With these advantages, the banking sector is more attractive for AI implementation than other sectors because it can improve competitiveness, security, and customer satisfaction.

`Despite the increasing adoption of AI technology in the banking industry, the level of disclosure of information related to its use in annual reports still varies among banks. Therefore, it is important to understand how AI disclosure in annual reports may affect financial performance indicators such as Return on Assets (ROA) and Return on Equity (ROE). Existing literature suggests that transparency in the disclosure of technology use, including AI, not only enhances corporate reputation but also contributes to better financial performance *(Shiyyab et al., 2023).*

The changing times have shifted various human activities towards automation and digitalization. The use of automated machines integrated with the internet has increased efficiency, productivity, and competitiveness *(Fonna, 2019)*. This digital transformation also affects the banking sector, driving the emergence of a digital banking economy with services such as online transactions, mobile banking, and internet banking, which increase operational efficiency and ease of access for customers *(Alnemer, 2022).* The development and utilization of integrated AI technology has the potential to make decisions and improve financial performance needed by stakeholders and shareholders *(Shiyyab, et al., 2023).* The Covid-19 pandemic has also accelerated digital transformation by changing people's orientation from physical economy to virtual economy, thus creating digital behavior. Based on data published by We Are Social & Hootsuite *(Kemp, 2023),* 66.5% of Indonesia's total population of 212.9 million people use the internet, this data has increased where the previous year there were 204.7 million internet users or 73.7% of the total population of Indonesia. This shows that the use of the internet has become a major need in Indonesian society, which provides an opportunity for companies to improve their quality or value.

Previous research has shown that AI disclosure has a positive impact on financial performance and investor confidence in the banking sector. However, there are still some research gaps that need to be addressed. First, previous studies tend to focus on specific countries, such as Jordan, without exploring how regulatory differences may affect AI disclosure and financial stability globally *(Shiyyab et al., 2023).* Second, while Explainable AI (XAI) has the potential to increase transparency in the financial system, research on its application in banking disclosure is limited *(Alapati & Valleru, 2023).* Third, research shows that while some banks have improved their AI disclosures, many are still in the early stages of AI implementation. AI disclosure has been shown to improve firms' accounting performance, especially in ROA and ROE, and lower operating costs *(Abdelraouf et al., 2025).* Fourth, the application of AI in accounting brings positive changes in improving efficiency, accuracy, and supporting better decision making *(Yusuf et al., 2024).* Finally, AI disclosures have been shown to improve operational efficiency and reduce costs, which in turn have a positive impact on the financial performance of banks *(Scardovi, 2023).*

Considering these research gaps, further studies are needed to develop a standard model of AI disclosure, explore the implementation of AI in financial reporting, and analyze how global regulations and external factors affect transparency and investor confidence in the banking sector. It is expected that the results of this study will show that banks that are more transparent in disclosing their use of AI will gain higher levels of investor confidence and achieve better financial performance compared to less transparent banks.

This study aims to examine the effect of Artificial Intelligence (AI) in annual reports on the financial performance of banks in Indonesia during the period 2022-2024. The test is conducted through analysis of several financial performance indicators, namely Return on Assets (ROA), Net Interest Income (NII), Price to Earning (P/E) and Total Expenses (TEXP). Thus, this study not only identifies the level of disclosure of AI technology information in financial statements, but also measures its direct impact on operational efficiency and bank profitability. Through a quantitative approach and panel data regression analysis, this study is expected to provide empirical evidence on the real contribution of AI to better financial performance in the Indonesian banking sector.

THEORETICAL FOUNDATION

The effect of AI usage frequency (AIFREC) on bank financial performance, as measured by Return on Equity (ROE).

Return on Equity (ROE) is a ratio used to measure net profit after tax against own capital, which reflects the efficiency in utilizing the company's equity. The higher the ROE ratio, the stronger the company's financial position, indicating a more effective use of capital *(Wijaya, 2019).* In the banking industry, the application of Artificial Intelligence (AI) has become a key strategy to improve operational efficiency and optimize financial decision-making. Research shows that AI has a significant impact on ROE, especially when combined with sustainability policies *(Gunawan & Sustaningrum, 2024).* The implementation of AI enables process automation, more accurate data analysis, and reduced operational costs, which directly contribute to increased profitability and efficient use of capital *(Cockburn, Henderson, & Stern, 2018).* In addition, the utilization of AI in financial risk management helps detect potential fraud faster, thereby increasing investor confidence in the financial stability of banks *(Jan, 2021).* Another study also confirmed that AI can optimize investment strategies and improve data-driven decision-making, which contributes to an increase in net profit and ROE of banking companies *(Al-Baity, 2023).* Furthermore, the sustainability factor acts as a moderator that strengthens the relationship between AI and ROE. Banks that implement sustainability policies tend to be more competitive and attract more investors *(Anis et al., 2023).* This, the implementation of AI in the banking industry not only improves operational efficiency but also strengthens profitability through increased ROE, especially in an increasingly competitive and digitized business environment.

H1: The frequency of AI usage (AIFREC) has a positive impact on bank financial performance, as measured by Return on Equity (ROE).

The effect of AI usage frequency (AIFREC) on bank financial performance, as measured by Net Interest Income (NII).

This ratio measures the ratio between a company's income and its total assets. Interest Income refers to the total gross service income in a given period.The higher the percentage obtained, the greater the company's ability to optimize its assets to generate revenue *(Rudiwantoro, 2020)*.In lending activities, banks earn operating income from loan interest *(Manurung & Marwansyah, 2017).* Net interest income ratio or Net Interest Margin (NIM) is one of the important indicators in investment strategy for banks and investors. NIM acts as a measure of bank profitability, especially in generating interest-based income. The

high profit from lending and the limited contribution of fee-based income make banks in Indonesia highly dependent on NIM to maintain profitability. Therefore, maintaining the NIM ratio at an optimal level is the main strategy in the banking industry *(Widyawati & Kusuma, 2020).* Net Interest Margin (NIM) also functions as a measuring tool for net interest income earned by banks or other financial institutions. This ratio shows the extent to which bank management is able to manage productive assets to generate profits. Net interest income is calculated as the difference between interest income and interest expense. In addition, NIM also reflects market risks that can arise due to changes in economic conditions, which have the potential to affect the financial stability of banks *(Widyawati & Kusuma, 2020).*

H2: The frequency of AI usage (AIFREC) has a positive effect on bank financial performance, as measured by Net Interest Income (NII).

The effect of frequency of AI usage (AIFREC) on bank financial performance, as measured by Total Expenses (TEXP).

Total Expense refers to all expenses incurred by the company *(Harto et al., 2019).* Total cost or economic cost includes all costs actually incurred for production factors. Companies oriented towards profit maximization will choose a combination of inputs that can minimize costs while optimizing profits *(Lutfi & Sunardi, 2019).* The frequency of use of Artificial Intelligence (AI) or AIFREC has a significant influence on bank financial performance through Total Expenses (TEXP). The implementation of AI enables automation of operational processes, cost reduction, and efficiency improvement. While AI implementation requires a high initial investment, including training and technology procurement costs, in the long run, the efficiencies generated can cover the investment and reduce total expenses. With optimal management, AIFREC has the potential to make a positive contribution to reducing Total Expenses (TEXP) and improving the bank's financial performance. Therefore, further research is needed to understand the long-term impact of AI in cost efficiency and profitability of the banking sector.

H3: Frequency of AI use (AIFREC) negatively affects bank financial performance, as measured by Total Expenses (TEXP).

The effect of frequency of AI usage (AIFREC) on bank financial performance, as measured by Price Earning (PE).

Price earning ratio is the price per share, this indicator has been practically applied in the final profit and loss financial statements and has become a standard form of financial reporting for public companies in Indonesia. This ratio shows how much investors value the share price against a multiple of earnings. A high price earning ratio indicates that investors expect high net profit growth from the company. A high price earning ratio on a stock can be interpreted as an expensive stock if in the future the company is unable to achieve higher net income *(Neldi et al., 2023).* The price to earnings (P/E) ratio is very important because it is closely related to stock prices. The P/E ratio shows how much investors are willing to pay per dollar of stock profits. This is why it is known as the multiple of a stock. This ratio has long been considered one of the most useful general financial parameters for assessing the market value of a company's stocks and shares. Financial analysts use this ratio as a tool to assess and determine the price of newly issued shares in an initial public offering (IPO) *(Farah Freihat, 2019).* There are many financial ratio analyses to measure the financial performance of LQ45 companies. Financial ratios consist of leverage ratios, liquidity, and market value ratios that present a comparison of the numbers in the financial statements. researchers use the Price Earning Ratio (PER) or the ratio of earnings from shares which is one way to measure stock performance on the stock exchange. So that with PER potential investors are able to assess and analyze the company's financial performance *(Neldi et al., 2023).* In the development of artificial intelligence (AI) systems for

stock investment, the Price to Earnings Ratio (PER) indicator is often used as a key input variable to assist machine learning algorithms, such as K-Nearest Neighbor (KNN) and Artificial Neural Network (ANN), in classifying stocks based on their financial characteristics. The use of PER as a proxy for the fundamental value of a stock allows AI models to identify the potential growth or stability of stocks, thereby improving the accuracy of predictions and the effectiveness of investment strategies. This shows that PER has a significant influence on the performance and accuracy of AI systems in making investment decisions *(Gao, 2020)*.

H4: Frequency of AI use (AIFREC) has a positive effect on bank financial performance, as measured by Price Earning (PE).

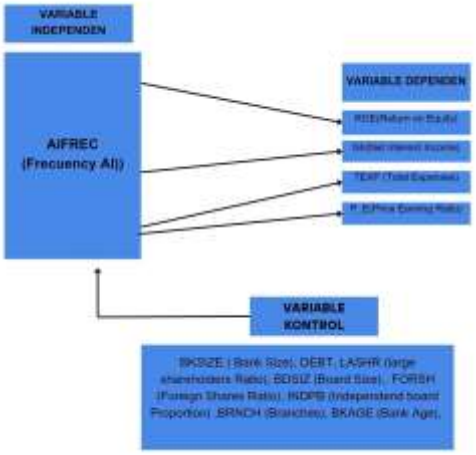

Figure 1. Framework of Thought

METHODOLOGY

This research was conducted in the banking sector with 14 conventional banks that have annual reports from 2022-2024 on the Indonesia Stock Exchange via the website www.idx.co.id. The research time is from 2022 to 2024. In this study, the method used is to conduct content analysis to evaluate disclosures related to the term Artificial Intelligence (AI) technology in the annual reports of 14 banks listed on the Indonesia Stock Exchange. The researcher will develop an AI disclosure index by conducting a thorough review of relevant and frequently mentioned AI components in the Indonesian financial sector, with reference to guidelines from authorities such as the Financial Services Authority (OJK) and Bank Indonesia. The research plans to analyze data from annual reports published by listed banks over a specific period, for example from 2022 to 2024, focusing on the counting and context of AI-related keywords, such as "Artificial Intelligence", "Machine Learning", and terms such as Artificial intelligence, Data analytics, Visual analytics, Conversational AI, IT Security, Privillege Access Management, Privilege Threat Management, Cyber security awareness, Cyber security risk management, Cyber security maturity, Cyber security, Cyber security risk, Machine Learning, Customer Service and software development, Information Technology, Privacy & Data security In addition, to evaluate the effect of disclosing AI terms on the financial performance of banks, regression analysis will also be conducted. This approach is expected to provide deep insights into the extent to which AI disclosures

contribute to the financial performance of financial institutions in Indonesia and understand the development of this technology in the context of an emerging market.

The researcher conducted a content analysis to calculate the frequency of occurrence of keyword terms related to AI in the annual reports. The collected data will be systematically analyzed to evaluate the level of AI disclosure and its relationship with the financial performance of banks. In addition, the researcher also conducted regression analysis to evaluate the effect on financial performance. With this approach, the research is expected to provide a deep insight into the attitudes and practices of Indonesian banks in adopting and disclosing the use of AI technology in their reports.

Meanwhile, qualitative data will be obtained from the context of the use of AI terms in the annual reports, providing a deeper understanding of how banks perceive and apply AI technology in their operational practices. The main source of data is the annual reports published by banks listed on the Indonesia Stock Exchange (IDX), which can be accessed through each bank's official website. In addition, other official documents and publications, such as press releases and research reports from financial institutions, will also be used to enrich the research perspective on technology adoption in the banking sector. Secondary sources from academic literature, journal articles, and industry reports that discuss AI adoption in the banking sector, both in Indonesia and globally, will provide useful additional context. By combining quantitative and qualitative data from relevant sources, this research is expected to provide a comprehensive insight into the disclosure and implementation of AI in the Indonesian banking sector.

Quantitative methods were used in this study. In addition, the panel data regression analysis method used is Eviews. Banking annual reports and idx.co.id financial reports are the secondary data sources used. Selecting this model is done through various tests. These include the Hausman test to determine the best model between Fixed Effect and Random Effect, and the Chow test to determine the Common Effect and Fixed Effect models. There is a significant effect of the independent variables on the dependent variable, as indicated by a p-value below 0.05.

The panel data regression equation used is as follows:

$$\text{Performance}_{i,t} = \beta_0+\beta_1 AIFREC_{t-1}+\beta_2 BSIZE_{t-1}+\beta_3 DEBT_{t-1}+\beta_4 BDSIZ_{t-1}+\beta_5 INDPB_{t-1}+\beta_6 FORSH_{t-1}+\beta_7 LASHR_{t-1}+\beta_8 BRNCH_{t-1}+\beta_9 BKAGE_{t-1}+\beta_{10} YEAR$$

AIFREC: The frequency of AI-related terms mentioned in annual reports. This variable is considered to affect the financial performance of banks.

BSIZE (Bank Size): Natural logarithm of total assets.

DEBT: The ratio of long-term debt to total assets of the bank

BDSIZ (Board Size): Number of directors on the board.

INDPB (Independent Board Proportion): The proportion of independent directors on the board.

FORSH (Foreign Shares Ratio): The ratio of foreign shares to total shares.

LASHR (Large Shareholders Ratio): Percentage of large shareholders who own more than 5% of the total shares.

BRNCH (Branches): The number of bank branches per year.

BKAGE (Bank Age): Total years the bank has been in operation.

RESULTS AND DISCUSSION

Descriptive Statistics

Table 1, Panel A presents data on how often Indonesian banks mention Artificial Intelligence (AI) related terms in their annual reports. Overall, there are 8,112 AI keywords found. From the data, Bank Negara Indonesia (BBNI) is the most active in disclosing AI topics by accounting for 18% of the total keywords, followed by Bank Mandiri (BMRI) at 13%, and Bank Permata (BNLI) at 12%. These banks show a high level of awareness and engagement on AI issues. Meanwhile, some other banks such as Bank Danamon (BDMN) and Bank BJB (BJBR), have a low frequency of disclosure, indicating that they have not been very active in conveying AI initiatives or implementation in their operations.

Panel B shows the trend of AI disclosures by year. It can be seen that in 2024, there is a large spike in the number of AI mentions, with Bank Negara Indonesia (BBNI) again leading the way at 21% of the total mentions that year, followed by Bank Permata (BNLI) and Bank Mandiri (BMRI) with 17% and 15% respectively. In total, there were 2,383 AI-related mentions, indicating a significant increase in attention to AI compared to previous years.

The findings show that Indonesian banks, especially state-owned enterprises and large private banks, are getting more serious in adopting and communicating the use of AI technologies. This is particularly relevant in the context of digital transformation and modern banking competition.

Table 1 Summary statistics on AI disclosures by bank and year

Panel A			Panel B			
AI Disclosure Frequency by Bank			**AI Disclosure Frequency by Bank**			
Nama Bank	**AIFREC**	**Per%**	**Nama Bank**	**Tahun**	**AIFREC**	**Per%**
BBCA (PT Bank Central Asia Tbk)	617	8%	BBCA (PT Bank Central Asia Tbk)	2024	252	10%
BBNI (PT Bank Negara Indonesia Tbk)	1458	18%	BBNI (PT Bank Negara Indonesia Tbk)	2024	502	21%
BBRI (PT Bank Rakyat Indonesia Persero)	435	5%	BBRI (PT Bank Rakyat Indonesia Persero)	2024	155	7%
BBTN (PT Bank Tabungan Negara (Persero) Tbk)	866	11%	BBTN (PT Bank Tabungan Negara (Persero) Tbk)	2022	307	13%
BKSW (PT Bank QNB Indonesia Tbk)	238	3%	MEGA (PT Bank Mega Tbk)	2024	227	10%
MEGA (PT Bank Mega Tbk)	631	8%	BMRI (PT Bank Mandiri (Persero) Tbk)	2024	356	15%
NISP (PT Bank OCBC NISP Tbk)	352	4%	BNGA (PT Bank CIMB Niaga Tbk)	2024	175	7%
SDRA (PT Bank Woori Saudara Indonesia)	242	3%	BNLI (PT Bank Permata Tbk)	2022	409	17%
BJBR (PT Bank Pembangunan Daerah Jawa Barat Tbk)	213	3%				
BDMN (PT Bank Danamon Indonesia Tbk)	174	2%				
BMRI (PT Bank Mandiri (Persero) Tbk)	1033	13%				
BNGA (PT Bank CIMB Niaga Tbk)	505	6%				
BNII (PT Bank Maybank Indonesia Tbk)	341	4%				
BNLI (PT Bank Permata Tbk)	1007	12%				
TOTAL	8112	100%	TOTAL		2383	100%

Table 2. shows the classification results of AI-related key words from banks' annual reports, which are divided into three main categories. The first category is AI digital awareness, transformation, and capabilities, which are terms related to digital awareness, transformation, and technological capabilities. There were 1,617 mentions, which is about 20% of the total detected terms. This shows that banks are quite active in discussing the importance of digital technology adaptation and their readiness to face the AI era. The second, most dominant category is AI application, product, service, and process, which includes key words related to the direct use of AI such as applications, digital services, and

automated systems. This category appeared 5,115 times, or 63% of the total. This indicates that the majority of AI discussions in banks' annual reports focus on the application of these technologies to support their operations and services, such as digital banking, mobile banking, or automation systems. The third category is information and cyber security, which are terms related to data security and cybersecurity. Although only mentioned 1,380 times (around 17%), this category is still important as it shows that banks are also starting to pay attention to the risks and challenges arising from the use of AI technologies, especially regarding data protection and information systems**.** SIn total, there were 8,112 mentions of AI-related keywords. This shows that artificial intelligence technology is indeed a serious concern in the banking sector, especially in terms of implementation and digital security.

Table 2 AI-related disclosure terms classified into three categories

AI-Related Terms/Words	Frecuency	Per%
AI digital awareness, transformation, and capabilities	1617	20%
AI application, product, service, and process	5115	63%
Information and cyber security	1380	17%
Total	8112	100%

Table 3, showing the descriptive statistics in the table, it can be seen that the average frequency of disclosure of terms related to Artificial Intelligence (AIFREC) in banks' annual reports is 187.11 times, with the lowest mention of 28 times and the highest of 502 times, indicating a large variation between banks in terms of disclosure of AI implementation. Return on Equity (ROE) has an average of 0.17 with a maximum value of 0.72 and a minimum of -0.11, indicating that some banks show very good return on equity performance, but some experience losses. Net Interest Income (NII) has an average value of 11.36 with a high standard deviation of 24.34, indicating significant differences in net interest income between banks. Total Expenses (TEXP) shows an average value of 8.12 with a maximum of 58.61, reflecting a large difference in the scale of operating expenses. Bank size (BKSIZE) is also highly diverse, with an average total assets of 148.94 and a maximum value of up to 469.61. The debt ratio (DEBT) averages at 0.18, while the proportion of large shareholdings (LARSHR) varies from 0.38 to 38.52, with an average of 2.53. foreign ownership (FORSH) is quite high with an average of 57%, indicating the important role of foreign investors in the banking sector. Board size (BDSIZE) consists of 9 members on average, while the proportion of independent boards (INDPB) is very low, averaging only 1%. The number of branches (BRNCH) and age of banks (BKAGE) also show notable diversity, with the average number of branches being 1,067 and the average age of banks being 62.71 years, indicating a large difference in operational scale and institutional experience between the observed banks.

Table 3 Descriptive Statistics Results

Variable	Obs No	Mean	Median	Sta Dev	Min	Max

AIFREC	42,00	187,11	148,00	128,72	28,00	502,00
ROE	42,00	0,17	0,14	0,15	-0,11	0,72
NII	42,00	11,36	4,97	24,34	0,00	104,28
P/E	42,00	12.48	9.47	10.79	-2.08	55.65
TEXP	42,00	8,12	4,27	13,91	0,01	58,61
BKSIZE	42,00	148,94	151,28	138,76	1,02	469,61
DEBT	42,00	0,18	0,08	0,25	0,00	0,87
LARSHR	42,00	2,53	0,85	8,14	0,38	38,52
FORSH	42,00	0,57	0,54	0,33	0,00	0,98
BDSIZE	42,00	9,28	9,00	2,25	5,00	12,00
INDPB	42,00	0,01	0,00	0,07	0,00	0,50
BRNCH	42,00	1067	394,00	1969	8,00	8209,00
BKAGE	42,00	62,71	65,00	25,6	18,00	129,00

Correlation

Table 4, produces correlation results with several significant relationships found between AI disclosure frequency (AIFREC) and internal bank characteristics. *** = significant at 1% level ($p < 0.01$); ** = significant at 5% level ($p < 0.05$); and * = significant at 10% level ($p < 0.10$).

Based on the results of the correlation analysis, several significant relationships were found between the frequency of disclosure of Artificial Intelligence related terms (AIFREC) and internal bank characteristics. First, there is a significant positive correlation between AIFREC and board size (BDSIZE) of 0.533, which is significant at the 1% level, indicating that the larger the number of board members, the higher the tendency of banks to disclose the use of AI in their annual reports. In contrast, there is a negative correlation between AIFREC and bank size (BKSIZE) of -0.193, although not significant, indicating that banks with larger assets tend to be less intensive in disclosing AI-related information.

Furthermore, the ratio of large ownership (LARSHR) is -0.425, which reflects that banks with the dominance of large shareholders tend to be less open in conveying information regarding the use of AI.

Meanwhile, the correlation of AIFREC with foreign ownership (FORSH) of -0.208 and the correlation with bank age (BKAGE) of -0.027 also show a negative direction, although not significant. Finally, the significant positive correlation between AIFREC and the number of bank branches (BRNCH) of 0.011, significant at the 5% level, indicates that banks with larger branch networks tend to be more active in communicating AI utilization. These findings suggest that the governance structure, ownership, and operational scale of banks play an important role in determining the level of openness to technological innovation, particularly in the context of AI reporting.

Table 4 Correlations Results

	AIFREC	BKSIZE	DEBT	LASHR	BDSIZE	INDPB	BRNCH
AIFREC	1.000						
BKSIZE	-0.193	1.000					
DEBT	-0.121	0.214	1.000				
LASHR	-0.425	0.160	-0.302	1.000			
FORSH	-0.208	0.098*	0.325	-0.007			
BDSIZE	0.533	-0.125	-0.349	-0.460	1.000		
INDPB	-0.185	0.092*	-0.012	0.205	-0.010	1.000	
BRNCH	0.011**	-0.328	-0.172	-0.301	0.451	-0.019	1.000
BKAGE	-0.027	0.134	-0.195	-0.157	0.511	0.030**	0.785

Regression Model

Table 5, shows the results of the OLS regression analysis that examines the effect of AI disclosure (AIFREC) on three indicators of bank performance: ROE, NII, and TEXP. *** = significant at 1% level (p < 0.01); ** = significant at 5% level (p < 0.05); and * = significant at 10% level (p < 0.10). Based on the results of the OLS regression analysis shown in the table, an overview of the effect of Artificial Intelligence (AIFREC) disclosure on three indicators of bank financial performance, namely Return on Equity (ROE), Net Interest Income (NII), and Total Expenses (TEXP). The results show that AI disclosure (AIFREC) has a negative influence on ROE with a coefficient of -0.000803, which indicates that an increase in the frequency of AI disclosure is not necessarily accompanied by an increase in return on equity. Meanwhile, on the NII and TEXP variables, AIFREC shows a positive relationship, amounting to 0.000701 and 0.001677, respectively. In addition, there is a significant PE of 10% (p=0.0751), implying that the more often AI is mentioned in the annual report, there is a tendency to increase interest income as well as operating expenses and indicating that the frequency of disclosure of terms related to Artificial Intelligence in the annual report has a positive influence on the P/E ratio, which indicates that the market values disclosure of technological information as a positive signal for the company's profit growth prospects. In other words, the more frequently banks disclose the use of AI, the greater investors' perception of the potential for improved financial performance in the future, which is then reflected in an increase in the price-to-earnings ratio.

This is logical given that the development and implementation of AI technology often requires large upfront investments, which can then gradually affect the efficiency of operational revenues and expenses.

The variable negatively affects ROE with a coefficient of -0.010721 and significant at the 10% level (p = 0.0931), indicating that centralized ownership can reduce equity profitability. Meanwhile, the DEBT variable has a 5% significant effect on NII and TEXP, with coefficients of 21.66474 (p = 0.0206**) and 8.482906 (p = 0.0220**) respectively, indicating that the higher the debt ratio, the higher the interest income and operating expenses borne by the bank.

BKAGE also shows a positive and significant influence on all indicators: ROE (0.068976, p = 0.0434**), NII (1.075756, p = 0.0688*), and TEXP (0.393480, p = 0.0909*),

indicating that longer operating banks tend to have more stable financial performance and higher operating expenses, possibly due to larger operational scale.

Overall, the high R^2 values in the NII (0.9964) and TEXP (0.9983) models, as well as the high adjusted R^2, indicate that the variables in the models are collectively very capable of explaining variations in bank financial performance. However, the direct relationship between AI disclosure frequency and bank financial performance still requires further study, as it has not fully exerted a statistically significant effect on key indicators such as ROE and operational efficiency.

Tabel 5 OLS Regression Result

	ROE	NII	TEXP	PE
AIFREC	-0.000803	0.000701	0.001677	0.074239
	0.1029	0.9328	0.6115	0.0751*
LASHR	-0.010721	0.131007	0.050628	-0.333998
	0.0931*	0.2319	0.2431	0.5207
DEBT	-0.830366	21.66474	8.482906	-37.48824
	0.1068	0.0206**	0.0220**	0.3752
FORSH	-0.038194	-2.766237	-0.814019	14.35501
	0.8734	0.5118	0.6252	0.4796
BDSIZE	-0.068225	-0.482479	-0.584893	5.365851
	0.2797	0.6579	0.1847	0.3115
INDPB	-0.002705	0.398594	-0.980874	2.995686
	0.9935	0.9455	0.6716	0.9149
BKSIZE	-0.000844	-0.046744	-0.000412	0.023184
	0.6595	0.1729	0.9752	0.8854
BRNCH	0.000064	0.003813	0.001564	0.015345
	0.8247	0.4539	0.4383	0.5301
BKAGE	0.068976	1.075756	0.393480	0.2378
	0.0434**	0.0688*	0.0909*	0.9303
Year Dummy	Yes	Yes	Yes	Yes
Bank Dummy	Yes	Yes	Yes	Yes
_constanta	-3.104504	-51.58085	-14.24992	-86.59727
Adj.R2	0.375900	0.992323	0.996309	0.095459
Prob (F-Statistic)	0.051103	0.000000	0.000000	0.348843

Based on the descriptive statistics, it can be seen that the disclosure of AI-related terms (AIFREC) in annual reports shows considerable variation between banks. This indicates that not all banks pay equal attention to AI issues in their communication strategies. It was found that frequency in the PE model, where AIFREC has a significant positive effect at the 10% level (p = 0.0751). This indicates that the market responds positively to the openness towards the use of AI, reflecting investors' optimism towards future earnings growth. In addition, DEBT has a positive and significant effect on NII and TEXP at the 5% level, while BKAGE bank age has a positive and significant effect on ROE, NII, and TEXP at the 5% and 10% levels, respectively. These findings suggest that operational experience and funding structure play an important role in explaining banks' financial performance. Overall, although AIFREC has not shown a significant effect on efficiency or direct profitability, the frequency of AI disclosure still has strategic value in building market perception and signaling the technological capacity of banks in the era of digital transformation.

Overall, these results suggest that AI disclosure in annual reports is not only a form of information transparency, but also reflects management's strategy in dealing with technological developments. While AI adoption may not necessarily improve all aspects of financial performance, these results support the view that AI disclosure can improve efficiency (through reduced costs) and enhance investor perceptions. However, the effect is highly dependent on the organizational structure and characteristics of each bank. Therefore, it is important for banks to not only focus on technology implementation, but also build effective reporting and communication systems to optimize the value of AI adoption.

CONCLUSION

This study aims to examine whether Artificial Intelligence (AI)-related terms disclosed in annual reports can be used as explanatory variables for bank financial performance. This study analyzed 42 annual reports from 14 banks listed in Indonesia over the period 2022 to 2024. The results of the analysis show an increase in the frequency of disclosure of AI terms since 2022. This finding reflects the increasing awareness of Indonesian banks towards the application, benefits, and implications of AI. However, some banks still show a low level of disclosure, indicating that they are still in the early stages of AI implementation, at least in terms of information transparency.

Artificial Intelligence (AI) in banking annual reports in Indonesia is increasingly showing a positive trend. Digital transformation driven by AI developments has been proven to contribute to operational efficiency, cost reduction, and improved quality of service to customers. This study comprehensively analyzes the frequency of AI term disclosure (AIFREC) and correlates it with financial performance indicators such as ROE, NII, PE and TEXP. The results show that although the effect of AI is not always significant, its positive impact is seen on ROE and market perception through an increase in P/E value. In addition, AI disclosure also has the potential to lower total bank expenses, suggesting that this technology is not only a symbol of modernization, but also a long-term efficiency strategy. Using a quantitative approach through panel data regression analysis, this study proves that the level of AI disclosure is strongly influenced by internal bank characteristics such as age, size, board structure, and shareholding. Therefore, more adaptive and structured reporting and management strategies are needed so that AI implementation can truly boost added value and investor confidence amidst the increasingly competitive banking environment.

The research also provides useful insights for banking executives, annual report users, regulators, and policy makers. The findings highlight that increased AI disclosure can increase investor confidence and provide a competitive advantage. In addition, AI-related information can help investors and financial analysts understand the extent to which companies are investing in this technology and its sustainability. For regulators, this study provides empirical evidence related to voluntary disclosure trends and provides a basis for formulating policies related to AI disclosures that are more structured and informative.

From a policy standpoint, this study emphasizes the importance of developing a standard framework for AI disclosure to improve transparency and clarity of annual reports for stakeholders. As such, the findings support the development of AI regulations globally to improve the quality and accountability of AI-related information.

This study also leaves room for further study. Further research is needed that considers internal company characteristics such as organizational culture, corporate governance, top management leadership, and ownership structure that may influence AI adoption decisions and disclosure levels. In addition, the evaluation of AI benefits can be focused at the business unit level or specific operational processes to identify specific impacts in greater depth.

The limitation in this study lies in the limitation of measuring AI disclosure using the frequency of occurrence of AI-related terms (AIFREC) in annual reports. While this method is objective and quantifiable, it does not consider the context and depth of disclosure. In other words, the quantity of mentions does not necessarily reflect the quality of substantial AI implementation in bank operations.

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