

Does Artificial Intelligence Improve Banking Financial Performance in Indonesia

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Article Info	ABSTRACT
Keywords: Artificial Intelligence and Banking Financial Performance	This study aims to find empirical evidence of the influence of artificial intelligence (AI) on banking financial performance (ROA) and (ROE). The population in this study were banking companies in Indonesia totaling 66 banks during 2018-2023 and obtained observation data of 389 data. Hypothesis testing using panel data regression using the help of the STATA version 12 application. The results of the study show that the application of artificial intelligence (AI) has a positive and significant influence on financial performance both measured using (ROA) and (ROE).
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INTRODUCTION

Artificial intelligence (AI) has become a hot topic in various sectors, including the banking sector in Indonesia. The banking industry is trying to adopt artificial intelligence to create a cyber defense system so that unauthorized access and cyber attacks can be minimized (Dosari et al., 2022). The pandemic has made digital services continue to grow, including in the banking sector, especially considering that artificial intelligence (AI) technology can prevent fraud in the banking system (Pasaribu, 2022). Advances in artificial intelligence and OCR (Optical Character Recognition) can deepen financial inclusion with the help of this technology, customers only need a smartphone and a Wi-Fi connection, to open a bank account in just a short time (Mamduh, 2022).

The Agency for the Assessment and Application of Technology (BPPT) launched the Indonesian National Strategy for Artificial Intelligence (Stranas KA) 2020-245, Stranas KA is the direction of national policy in the development of artificial intelligence technology.(www.bppt.go.id, 2020). The use of artificial intelligence technology is increasingly prevalent in all sectors. In Indonesia, a clear and firm legal umbrella is needed on how to regulate the use of artificial intelligence technology.(Media, 2023). Kominfo has prepared three strategic steps to support the use of AI in Indonesia, namely preparing and developing digital talents who are proficient in AI technology, facilitating the development of the ecosystem and preparing regulations and governance.(www.kominfo.go.id, 2020).The Financial Services Authority (OJK) has appealed to the financial sector, such as the banking industry, to implement artificial intelligence (AI) in its business operations.(Ulya, 2021).Banking is required to be able to improve digital security through the application of

the latest technology, one of the new technologies that is widely applied by banking is artificial intelligence (AI) technology.(www.ojk.go.id, 2021). Artificial intelligence (AI) is starting to be used in the banking system in Indonesia. Artificial Intelligence is considered to be able to boost the economy and is ready to be used on a large scale because of the solid trend(Pusparisa, 2023).

Artificial intelligence (AI) has emerged as a transformative technology in the banking sector, with significant implications for financial performance. Garg (2024) concluded that AI adoption is positively associated with improvements in key financial metrics such as cost-to-income ratio and return on assets for banks. Abusalma (2021) showed that AI tools enable more efficient workflows and decision-making processes, demonstrating the potential of AI to improve loan portfolio quality and reduce credit losses. Elegunde and Shotunde (2020) concluded that these AI-driven improvements result in improved overall bank financial performance. Deloitte (2024) projected that AI adoption is likely to be the single largest controllable factor determining banks' competitiveness and financial success over the next five years.

The application of artificial intelligence is a new phenomenon in the banking sector. In previous literature it has been discussed that the application of artificial intelligence has a positive impact on banking performance, but empirically there is still no concrete evidence regarding this, especially in banking in Indonesia, so this study aims to find empirical evidence of the effect of the application of artificial intelligence on financial performance in the banking sector in Indonesia.

Hypothesis

Financial institutions are increasingly leveraging advanced technologies, including Artificial Intelligence (AI), to improve their operations and decision-making processes.(Giudici et al., 2023). Artificial Intelligence has been involved in the field of Finance in the areas of financial forecasting, financial protection, and financial analysis as well as decision making.(Li et al., 2023). Artificial Intelligence has a significant impact on sustainable finance by providing solutions, improving decision-making, and enhancing financial reporting for sustainable investments.(Sartawi et al., 2022). Artificial Intelligence-based technologies, such as cryptocurrencies, Robo-advisor systems, and the Internet of Things, are also having an impact on digital banking services.(Doumpos et al., 2023).

Mikalef et al. (2023) found that the mechanisms by which artificial intelligence competencies influence business marketing capabilities.Prentice et al. (2023) found that artificial intelligence performance has a significant effect on work engagement, and employee service performance, which is significantly related to work performance assessment.Fredström et al. (2022)found that to improve business performance, companies must communicate using AI-related vocabulary especially when the topic is innovation and collaboration. From the explanation above, it can be concluded that the better the application of artificial intelligence in banking will improve banking financial performance, so that the following research hypothesis can be drawn:

H1: The application of artificial intelligence has a positive effect on ROA.

H2: The application of artificial intelligence has a positive effect on ROE.

RESEARCH METHODS

This study is a type of quantitative research that examines the effect of artificial intelligence on the financial performance of the banking sector in Indonesia. The population in this study is banking companies in Indonesia registered with the Financial Services Authority (OJK), while the sampling technique in this study uses a purposive sampling technique with the following criteria:

1. Banking companies that provide company websites.
2. Banking companies that publish annual reports in 2019 – 2022, the reason for taking the 2019 – 2022 sample is because that year reflects two different conditions where 2019-2020 reflects the COVID-19 conditions and 2021-2022 reflects the post-COVID-19 conditions.
3. Companies that present complete information in annual reports and sustainability reports that are in accordance with the indicators in this study.

Banking financial performance in this study is measured using return on assets (ROA), namely net profit divided by total assets, and is also measured using return on equity (ROE), namely net profit divided by total equity. Measurement of the application of artificial intelligence refers to artificial intelligence indexes adopted from [Evident - Evident AI Index \(evidentinsights.com\)](https://evidentinsights.com). where each bank that submits information according to the index will be given a value of 1 and if it does not submit it will be given a value of 0, while the control variable uses Size which is measured using the natural logarithm of asset value. The data analysis method in this study uses panel data regression with the help of the STATA version 12 application.

Table 3.1 Measurement of Banking Artificial Intelligence Index

Indicator	Assessment Method
Fraud detection and prevention	Analyze large amounts of data to identify patterns and anomalies that may indicate fraudulent activity.
Customer service	Artificial intelligence chatbots can provide personalized and efficient customer service, such as answering frequently asked questions and assisting customers with account management tasks.
Personalized product recommendations	Analyzing customer data for personalized product recommendations, such as credit card offers or investment opportunities. Cross-selling new products to existing customers is a key value driver in banking.
Risk assessment	Analyzing data to make more accurate risk assessments, which can help banks make more informed operational, lending, and market decisions.
Credit guarantee	Analyzing data to produce more accurate credit underwriting decisions, which can help banks assess the risk of lending to specific borrowers.
Portfolio management	Helping banks manage and optimize their investment

Indicator	Assessment Method
Cyber security	portfolios. Detecting and preventing cybersecurity threats, such as by analyzing network traffic for signs of malicious activity.
Trade finance	Automate and streamline trade finance processes, such as by analyzing and verifying trade documents.
Market analysis	Analyzing market trends to make more accurate market predictions, which can help banks make better-informed investment decisions.
Recruitment	Video interview tools can be used to identify and prioritize promising candidates for human interviews.

Source:(Evident, 2023)

RESULTS

Table 4.1 Descriptive Analysis Results

Variable	Obs	Mean	Std. Dev.	Min	Max
ROE	389	0.042	0.056	0.000	0.450
ROA	389	0.072	0.205	-0.801	0.983
AI	389	0.088	0.178	0.000	0.900
SIZE	389	23,820	4,707	16,524	38,557
Covid Year	389	0.491	0.501	0.000	1,000

Source: Processed data (2025)

From table 4.1 above, it can be seen that the ROE variable has a minimum value of 0.000 and a maximum value of 0.000.0.450 and a mean value of 0.042, ROA has a minimum value of -0.801 and a maximum value of 0.983, the artificial intelligence (AI) variable has a minimum value of 0.000 and a maximum of 0.900 and a mean value of 0.088.

Table 4.2 Panel data regression results

	ROA	ROE
AI	0.001***	0.000***
	3,200	66,630
SIZE	0.367	0.4700
	-0.900	-0.7200
Covid Year	0.183	0.4170
	-1,340	-0.8100
_cons	0.000***	0.000***
	-13,320	-9.0100
Adj. R	0.9368	0.9351
F-Statistics	15,679	15,679
F-Statistic Prob	0.000***	0.000***
N	389	389
Significance Level: *10%, **5%, ***1%		

From table 4.2 above, it can be seen that the artificial intelligence (AI) variable has a positive influence on financial performance (ROA) with a probability value of $0.0001 < 0.001$. artificial intelligence (AI) has a positive influence on financial performance (ROE) with a probability value of $0.000 < 0.001$.

Discussion

The results of the study show that artificial intelligence (AI) has a positive influence on banking financial performance using both (ROA) and (ROE). These results indicate that the use of artificial intelligence in banking will improve the performance of financial services such as payment system automation, fraud detection and prevention, portfolio management and cybersecurity will improve the banking system so that it will improve overall banking performance both in terms of service and profitability. Other findings show that Size and Year of Covid have no effect on banking financial performance. This shows that banking in Indonesia optimizes technology more than the use of assets in gaining advantages to improve financial performance.

The results of this study are in line with the results of research from Mittal et al. (2023) shows that Artificial Intelligence can simplify the knowledge process, making it more efficient and robust. Mishra and Sant (2021) showed that the success of implementing technology Artificial Intelligence in banking institutions has increased access to financial services for marginalized groups. Subramaniam et al. (2024) stated that Artificial Intelligence contribute significantly to financial inclusion by addressing historical barriers faced by underserved populations.

CONCLUSION

The purpose of this study is to find empirical evidence of the effect of the application of artificial intelligence on financial performance. The results of the study indicate that the application of artificial intelligence (AI) improves banking financial performance, both measured using (ROA) and (ROE). The results of this study are expected to be able to serve as a guideline for policy makers in banking, especially the OJK, in preparing guidelines for implementing artificial intelligence in banking, considering that the results of the study show that artificial intelligence has a positive and significant influence on the financial performance of banking in Indonesia.

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